## MODEL RAH SERIES TROUBLE SHOOTING NOTES

| Difficulty Encountered | Cause and Remedy |
|---|---|
| Receiver very insensitive, noisy and intermittent. Operation occasionally restored by snapping power switch off and on. | Found no screen voltage on r-f tubes and 5 ohms resistance to ground from screen. Trouble found to be due to ground at screen end of iron core choke X–7. Emergency repair made by removing choke and connecting screens of r-f tubes directly to the voltage divider.—U. S. S. *Refuge* (AH–11) |

## HIGH HUM LEVEL IN MODELS RAK/RAL SERIES RECEIVING EQUIPMENTS

In the event that high hum level develops in the models RAK/RAL series receiving equipments, the trouble may be traced to the type 6D6 tubes employed in the detector and audio amplifier stages. It has been discovered that the type 6D6 manufactured by Ken-Rad produces excessive hum when used in these stages. This trouble has been traced to the construction of the heater element. The RCA tubes originally supplied in these equipments have a spiral wound heater, while the tubes in question (a large quantity are on hand at stock depots) use the folded type heater. In circuits employing a high resistance in the grid return or high bias, any leakage of electrons from the a-c operated heater over the top or under the bottom of the cathode to the grid can cause hum modulation. Any type 6D6 available should operate satisfactorily in r-f circuits and other circuits where the grid return resistance is of a relatively low value.

●

## 60-WATT OPERATION OF MODEL RAK RECEIVING EQUIPMENTS

When one RAK and one RAL are energized by a 300-watt rotary converter, it is necessary to operate the RAL at 200 watts and the RAK at 60 watts.

Paragraph 9.5–6 of the instruction book for the subject equipment indicates that the switch [1] in the power unit disconnects the current regulator tube and switches the power transformer primary for operation directly connected to the line filter. The switch in the power unit disconnects the power transformer from the current regulator circuit but does not disconnect the current regulator tube from the a-c power line. The equipment therefore continues to require 200 watts. For 60-watt operation it is necessary that the type 876 current regulator tube be removed from the socket in the power unit, and that the switch be thrown to the "out" position.

[1] Switch designated as follows: RAK/–1—208 and 209, RAK–2/–3—S–102 and S–103, RAK–4/–5/–6/–7/–8—S–202.

●

## → RAK RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 1 and RAL RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 1

### PROVIDING CONCENTRIC ANTENNA JACK

*Equipments affected.*—All models RAK–6 and RAL–6 radio receivers except those in which the antenna coupling units have been installed for use with receiver antenna patch panels.

*Purpose.*—To provide a type 49120 concentric jack connection for the antenna permitting the use of a type 49123 concentric patchcord assembly reducing interference to a minimum.

*General.*—Numerous investigations have proven that a completely shielded low capacity antenna lead is an absolute necessity in practically all types of Naval vessels in order to reduce interference to an acceptable level. For this reason the Bureau has procured a number of modification kits for the models RAK–6 and RAL–6 receivers which provide a type 49120 concentric jack connection for the antenna and thus permit the use of a type 49123 concentric patchcord assembly. These kits are being procured under contract NOs–95022 and are being delivered to the various Electronic Pools for distribution to Naval activities.

Each modification kit contains two complete assemblies as shown in Figure 1; one (MI–8531) is for the model RAK–6, and one (MI–8532) for the model RAL–6. The two assemblies are identical except for the coupling capacitor, symbol C–101. This capacitor has a rating of 300 mmfd. on the RAK–6 assembly and 440 mmfd. on the RAL–6 assembly. One spare coupling capacitor is furnished for each assembly and should be placed in the respective receiver spare parts boxes. The two plug buttons supplied with each assembly are to be inserted in the two binding-post holes in the cabinet which are not required after installation of the new assembly.

The modification consists, basically, of removing the present binding-post-type antenna terminal board assembly and replacing it with the new concentric jack type assembly. Complete instructions and diagrams are packed with each kit and should be carefully followed. These instruction sheets should be inserted in the respective instruction books after completion of the modifications.

The choke and capacitor units should be removed from the replaced binding-post assemblies and stowed in the receiver spare parts boxes. The remainder of the assemblies may be discarded.

Vessels are requested to contact an Electronics Officer at the next opportunity for the installation of this kit.

A record of completion of this installation should be made on the ship's "Radio Equipment Log", NAVSHIPS 900,039. Completion of this installation should be reported on the NBS–383 form. *2/1/46*

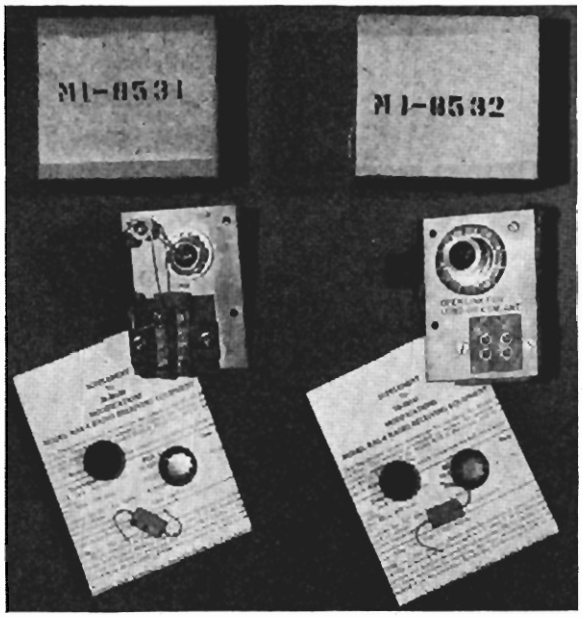



FIGURE 1.—Contents of kit.

●

## RAK RADIO RECEIVING EQUIPMENT
## FIELD CHANGE NO. 2
and
## RAL RADIO RECEIVING EQUIPMENT
## FIELD CHANGE NO. 2

### REPLACING POWER SUPPLY RESISTORS R–202, R–203 AND R–204 (NO KIT)

*Equipments affected.*—All model RAK series equipments through RAK–6, and all model RAL series equipments through RAL–6.

*Purpose.*—To replace resistors R–202, R–203, and R–204 with resistors of higher power rating.

*Procedure.*—(1) Remove R–202 and replace with a 20,000-ohm 4-watt resistor, JAN type RC 65 DE 203J.

(2) Remove R–203 and R–204 and replace each with a 6,200-ohm 4-watt resistor, JAN type RC 65 DE 622J.

(3) The JAN resistors are now standard for Naval use and may be obtained through supply channels.

*General.*—The Bureau has received numerous reports of failure of resistors R–202, R–203, and R–204 in the type CRV–20036A power supply for models RAK and RAL series receivers. This matter has been brought to the attention of the contractor who has advised that beginning with the RAK–7 and RAL–7 the power rating of the resistors has been increased from two to four watts.

Vessels are requested to contact an Electronics Officer at the earliest opportunity for the new resistors. This change is within the scope of the ship's force.

The instruction book and parts list should be corrected accordingly. A record of completion of this change should be made on the ship's "Radio Equipment Log", NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *2/1/46*

●

## RAK RADIO RECEIVING EQUIPMENT
## FIELD CHANGE NO. 3
and
## RAL RADIO RECEIVING EQUIPMENT
## FIELD CHANGE NO. 3

### FUSING OF THE EQUIPMENTS (NO KIT)

*Equipments affected.*—All models RAK and RAL series receivers.

*Purpose.*—To provide a system of fusing where only one receiver is used at a time.

*Procedure.*—Change the connections in the power supply unit for each receiver so that the 110-volt a-c connections from the control unit pass through the 3-ampere fuses in each power supply unit. This is easily accomplished by moving the a-c line to the other set of terminals in the power supply unit.

*General.*—A deficiency has been reported in the fusing of the RAK/RAL series receivers. The receiver is fused as follows: 5-ampere fuses, F–301 and F–302, are located in each side of the 110-volt a-c line, at the control unit 23073; 3-ampere fuses, F–201 and F–202, are located in each side of the 110-volt a-c line at each power supply for the receivers RAK/RAL. The instruction books specify that where the control unit 23073 is used with a RAK/RAL installation, the 110-volt a-c supply shall be connected through only F–301 and F–302 and that F–201 and F–202 be used when only one receiver and no control unit 23073 is used. This system of fusing is satisfactory where both the RAK and RAL are used at the same time with the control unit 23073.

However, where only one receiver is used at a time, insufficient protection is afforded by fusing one receiver with the 5-ampere fuse of the control unit. In one incident, the transformer T–201 was damaged but insufficient current was drawn to blow the 5-ampere fuse.

This change will give maximum protection for each receiver whether used together or separately with or without the control unit.

The instruction book, schematic diagrams, and wiring diagrams should be changed accordingly. A record of completion of this change should be made on ship's "Radio Equipment Log," NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *2/1/46* ←



681676°—46——3

## MODELS RAK/RAL SERIES TROUBLE SHOOTING NOTES

| Difficulty Encountered | Cause and Remedy |
|---|---|
| Noise, erratic regeneration. | Loose and dirty tube shields. Cleaned joints with fine sandpaper, made sure shields were tight.—U. S. S. *Suwanee* |
| Low volume. | Check receiver attenuator relays for open antenna circuit.—RMO, *Galveston* |
| RAK-7/RAL-7.—Fouling of band change switch pinion gears. | Shorten leads to bypass condensers in the vicinity of the band change switch pinion gears.—RMO, *Nymi* |
| RAK.—Receiver inoperative. | Found loose connection at J-1 in loop coupling unit.—U. S. S. *Bowfin* |
| Very weak signals in receivers. Antenna-to-ground resistance reading low. | Upon investigation of the antenna trunk, water was found in its base. The water was up over the entering insulator coming in contact with the antenna lead and causing it to be shorted to the ground. It was found that the water had entered through the seams on the whip antenna and through the standoff insulator which is between the ship antenna and trunk. A small hole was drilled in the base of the trunk and the water was allowed to drain. After the water had drained the hole was tapped and a plug installed.—U. S. S. *Herndon* |
| Low audio output; loss of sensitivity. | Audio screen bypass condenser, C-125, shorted. |
| RAL Series.—Receiver dead. No plate voltage on second r-f amplifier. | The "regeneration" windings for bands 4, 5, and 6 on inductance L-108 pass through a steatite ceramic tube on the very edge of the slot that contains the primary windings. The regeneration winding is at ground potential and the primary winding has a potential of 80 volts. As a result of both windings being enamel covered, a short developed between them, thereby grounding the plate voltage for the second r-f stage. Repairs were made by removing the primary windings, placing a piece of varnished cambric over the slot in the tube at the point where the regeneration winding goes into the hole, and then rewinding the primary over the varnished cambric. This provided insulation between the two windings at the point of the shorting.—U. S. S. *Mercy* |
| Extremely noisy in operation. | Cleaned moving contacts and resistance elements in both sections of sensitivity control with carbon tetrachloride. Operation restored to normal. A *very thin* coating of vaseline prevents subsequent trouble.—U. S. S. *Rowe* |
| RAL Series.—Receiver not stable, stations drifted across dial, also receiver was very noisy. | Found resistor R-201 in power supply broken with wires making intermittent contact. Normal operation restored by replacement of resistor. The resistor in question is in series with the 874 current regulator tube and opening of the resistor caused loss of regulation.—U. S. S. *Calvert* |
| RAL-6.—Intermittent operation and erratic regeneration. | It was found that the trouble was caused by a bad ground connection on the second r-f tube V-102, type 6D6. Normal operation was restored by making proper connection.—U. S. S. *Elkhorn* (AOG-7) |

| | |
|---|---|
| RAL Series.—Check of receiver disclosed that it operated normally on all bands but 7, 8, and 9. | Discovered, upon further checking, that the primary winding in the antenna transformer was open—a direct result of, at some time, receiving a ',shot" of RF. Since this opening was at a terminal connection, it was possible to "jump" the break by a piece of wire. The set then operated perfectly.—U. S. S. *Curtiss* |
| RAK–6.—No signals were heard. | Sensitivity check showed 1500 microvolt sensitivity. The setting of the regeneration control was unusually high on those bands on which any regeneration could be obtained and the setting of this control was affected by movements of the sensitivity control. A voltage check showed that the 180-volt B supply was varied by changes in sensitivity control setting. The cause was due to capacitor C–112 developing a 0.25-megohm internal short circuit, thereby biasing the grid of the next stage positive. Replaced capacitor and operation was normal. |
| RAL—6.—Signals very weak. | Found R–101 in first r-f amplifier circuit burned out. Replaced with spare and operation again normal. R–101 is located under the shield plate in the variable capacitor compartment.—U. S. S. *Cinchona* (AN–12) |
| RAL–7.—Intermittent regeneration and erratic operation. | Detector tube socket plate prong receptacle discovered to be faulty. It had snapped in two resulting in contact on one side of prong only. Heavy seas or jars would cause signal to drop out. Installed new tube socket, circuit symbol X–103, and normal operation was resumed.—U. S. S. *Signet* |
| RAL–8.—Intermittent reception while tuning toward the low-frequency end on all bands. | This failure was found to be caused by the main tuning capacitor C–102C in the detector stage shorting. This defect was temporarily remedied by placing a small wood spacer under the spring at the end of the rotor shaft nearest the defective section. The failure was permanently corrected by replacing the capacitor.—U. S. S. *Winged Arrow* |
| RAL–2.—Stray oscillations present on higher frequencies when switch S–15 is in SHARP position, the oscillation persisting even when volume and regeneration controls were set at minimum. | Feedback was found to be occurring between leads of L–13 (type CRV–53032 low pass filter) and grid lead of tube V–4 (type 6D6). Repaired by rerouting leads to L–13 and shielding grid lead of V–4. Receiver then was perfectly stable.—U. S. S. *Relief* (AH–1) |
| RAL–5.—Very noisy reception with frequency shift whenever the receiver was moved or jarred. | Cleaned and very lightly burnished the rotor and stator contacts of all coil switches which remedied the trouble.—U. S. S. *Alabama* (BB–60) |
| RAL–6.—Unable to pick up any signals on any band but receiver had normal amount of tube hiss noise. | Found to be due to an open in the antenna patch cord.—U. S. S. *Breeman* (DE–104) |
| → RAK/RAL–6.—Weak output from RAL–6 receiver. | Removing audio leads to control unit from the receiver brought the signal level back to normal. Upon investigation of control unit it was found that an audio lead was grounded by a lug. Ground was removed by bending lug back to shape and normal operation restored.—U. S. S. *Chiwawa* (AO–68) |
| RAK–6.—Lost signal entirely. No regeneration. | Found that solder joints between one side of R–114 and one side of R–115 were so close that they touched shorting out R–115. Pushed them apart to prevent further troubles.—U. S. S. *Cabildo* (LSD–16) ← |

## MODEL RAO SERIES TROUBLE SHOOTING NOTES

| Difficulty Encountered | Cause and Remedy |
|---|---|
| RAO–4.—Receiver oscillating on all bands. | Check fuse holders F–101 and F–102. This activity has found many of these fuse holders defective. The soldering lug connection through the middle of the hard rubber case to the inside ferrule is often not properly made. Even when properly soldered there is a tendency in this type of fuse holder for the lug to break off. To make repairs, the whole rear and bottom of the receiver must be removed.—RMO *Nymyk* |
| RAO–3.—Impossible to receive signals on band "C". Noticeable background noise received when the r-f and audio gains were full on. Other bands normal. | The r-f coil assembly was checked and it was found that the plates of the oscillator trimmer capacitor C–121 were shorted. The plates were not bent, but apparently had not been correctly spaced at the time of manufacture. To correct this, the condenser was detached from the coil assembly. The stator plate assembly was removed and unsoldered in the same manner. The stator plates were then respaced and centered so they would "mesh" correctly with the rotor plates. The condenser was reassembled and installed in receiver. Normal operation restored after oscillator realignment. |
| RAO–2.—No receiver output. | Investigation disclosed grounded antenna circuit and shorted C–150. Cleared grounds and replaced defective C–150 capacitor. Operation then was normal.—U. S. S. *Callaway* |
| Low receiver sensitivity. | Investigation disclosed dirty contacts on band switching unit. Cleaned contacts and reception was greatly improved.—U. S. S. *Callaway* |
| RAO–2.—Receiver very weak and sometimes dead. | Found that output transformer T–102 broke down under load. The transformer checked perfectly with set turned off, but failed to operate with set turned on. Cured by replacement of transformer.—U. S. S. *Silenus* (AGP–11) |
| Erratic operation of receiver on 1300-kc. to 2800-kc. band. | Found cold soldered joint between coil and terminal in band change circuit.—U. S. S. *Acoutis* (AGP–12) |
| Receiver cutting off and on. | Found cold soldered joint on antenna post stud. |
| RAO–3.—Very low audio output from receiver. | Trouble was found to be in the audio output transformer T–102, the two secondary leads having broken off completely at the terminal strip. When resoldered to the lugs, normal operation was restored. Apparently, the leads had broken off because they protruded too far above the chassis and were in the way of the coil carriage. Each time the band was changed on the receiver, the carriage hit the leads. Dressing the leads away from the carriage eliminated future troubles.—U. S. S. *LST–561* |
| RAO–3.—AVC system inoperative due to excessive negative voltage output. | This was caused by a faulty capacitor C–145 in the grid circuit of V–107B. C–145 had developed a high resistance leak. Operation satisfactory when the capacitor was replaced.—U. S. S. *Oceanus* (ARB–2) |

| | |
|---|---|
| RAO–4.—Receiver oscillating on all bands. | Found poor ground at capacitor shaft C–101A. Tightened capacitor shaft ground and sensitivity improved considerably.—*LST–869* |
| RAO–2.—Loss of receiver noise with strong signals just audible. | Found that volume control R–121 was open; also coupling capacitor C–138 broken loose at connection. Also found tube socket for first audio tube V–106 defective (rocking the tube in its socket caused the signals to cut in and out). Repaired socket by squeezing connections.—U. S. S. *Onslow* (AVP 38) |

## MODIFICATION TO BROADEN THE TUNING OF MODEL RAS RECEIVING EQUIPMENTS

Model RAS receiver, Navy type CNA–46080, tunes very sharply and is often more useful to Naval air station control towers when arranged to tune more broadly. Practical methods for broadening the tuning include overcoupling, staggering the i-f tuning or installing more broadly tuned i-f transformers in place of the present ones.

Staggering may be accomplished by adjusting the transformer tuning while using a wobbulated signal and oscilloscope.

Model RAS series modification kits are available, for Naval air station control towers only, to Radio Material Officers under contract NXss–24547 by requisitioning them from Navy Yard, New York, and Navy Yard, Mare Island. These kits contain two i-f transformers (Navy type CNA–47340), one i-f transformer (Navy type CNA–47341), one capacitor (Navy type CAW–481072) and one nameplate labeled with Navy type CNA–46080–A.

Using this kit, the Navy type CNA–46080 radio receiver may be converted into the Navy type CNA–46080–A radio receiver by making the following changes:

(1) Replace the transformers now in positions T–101 and T–102 with Navy type CNA–47340.

(2) Replace transformer now in position T–104 with Navy type CNA–47341.

(3) Connect a Navy type CAW–481072 capacitor in parallel with capacitor C–137.

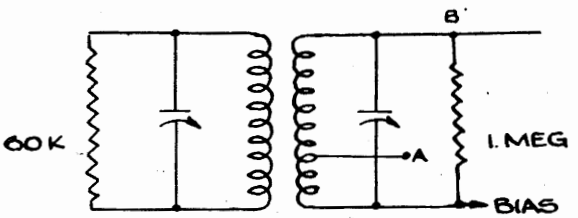
(4) Install a nameplate on the modified CNA–46080–A receiver which bears the Navy type number CNA–46080–A.

The result of this modification will be a receiver with a pass band approximately three times as wide as originally. The color code for the CNA–47340 and CNA–47341 is:

Grid—Green
Plate—Blue
Grid Return—Black
B-Plus—Red

The following method of broadening the i-f response by overcoupling is known as Navy Yard Pearl Harbor plan No. RV–46–A–124. The modification just described is preferred to this modification. In addition, it is pointed out that this is a delicate modification and should not be attempted except in a laboratory. It was accomplished as follows:

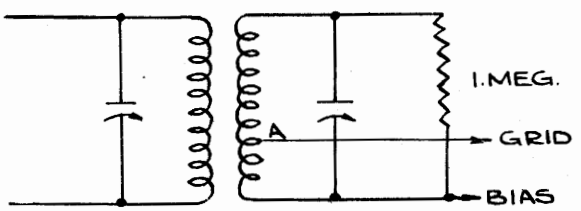
(1) Three intermediate-frequency coils were removed from the shield cans and the coupling was increased by decreasing the distance between the primary and secondary coils from 1½″ to 7/16″. It was necessary to apply heat to the porcelain coil form to accomplish the movement of the primary coil.




REVISED I.F. 1 & 2

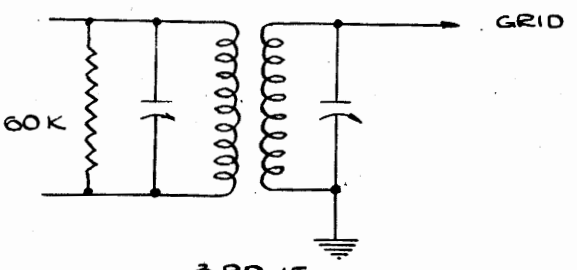
FIGURE 2.—Revised first and second i-f stages.

(2) The secondaries of the first and second stage intermediate-frequency transformers have a tap to which the grid was connected in the original installation as shown at "A" in Figure 1. The grid connection was removed from this tap and attached to the extreme end of the coil which




ORIGINAL I.F. 1 & 2

FIGURE 1.—Original connections.




3RD. I.F.

FIGURE 3.—Revised third i-f stage.

is connected to the stator plates of the trimmer condenser as shown at "B" in Figure 2.

(3) A ½-watt resistor of 60,000 ohms was connected in parallel with the primary circuit of each i-f stage, as shown in Figures 2 and 3.

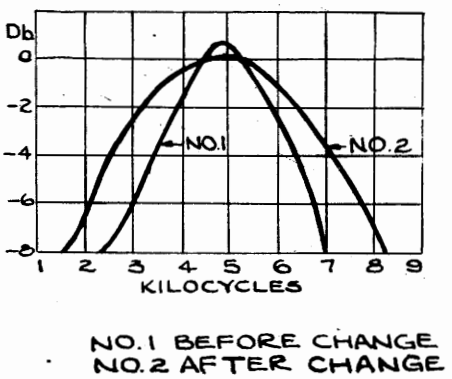



FIGURE 4.—Selectivity before and after the modification.

(4) Selectivity before and after modification is shown in Figure 4.

●

## MODIFICATION TO IMPROVE THE TUNING CONDENSERS OF MODEL RAS RECEIVING EQUIPMENTS

*As the modification to be described is critical and the capacitance of the tuning condenser sections must be measured as part of the modification process, this modification should be attempted only by qualified personnel with adequate instruments. Read all directions thoroughly before starting the modification.*

In certain RAS equipments the drive on the main tuning condenser has seized when working under conditions of high humidity. In order to effect a positive cure for this defect it is necessary to completely strip the assembly, remove a small amount from the bearing surface of the main shaft and finally to impregnate the bakelite covering of the shaft with wax to prevent further ingress of moisture. This modification should be carried out as required, or when an equipment is returned for complete overhaul. The necessary steps are as follows:

(1) As each pair of rotors and stators is carefully matched it is important that each section is marked before disassembling to insure reassembling in the same order.

(2) Remove dust cover from base of chassis, coil screening box, and coil unit.

(3) Unsolder the four stator and four rotor leads and grounding lead from right-hand end of assembly.

(4) Turn dial to zero, loosen set screws and remove; take great care not to disturb internal dial mechanism.

(5) Remove the four fixing screws from within base of chassis located immediately beneath condenser gear box. The gang assembly can then be withdrawn from the top of receiver.

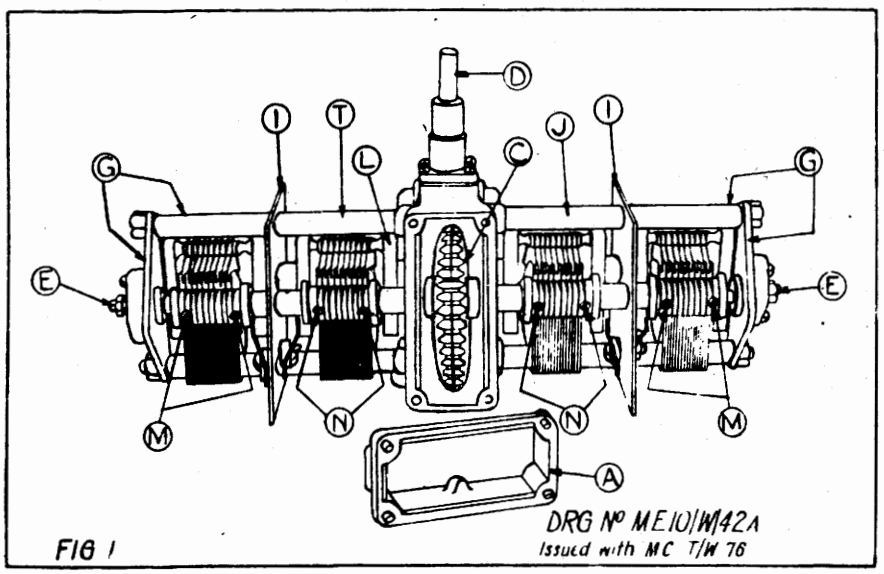



FIGURE 1.—Main tuning condenser assembly.

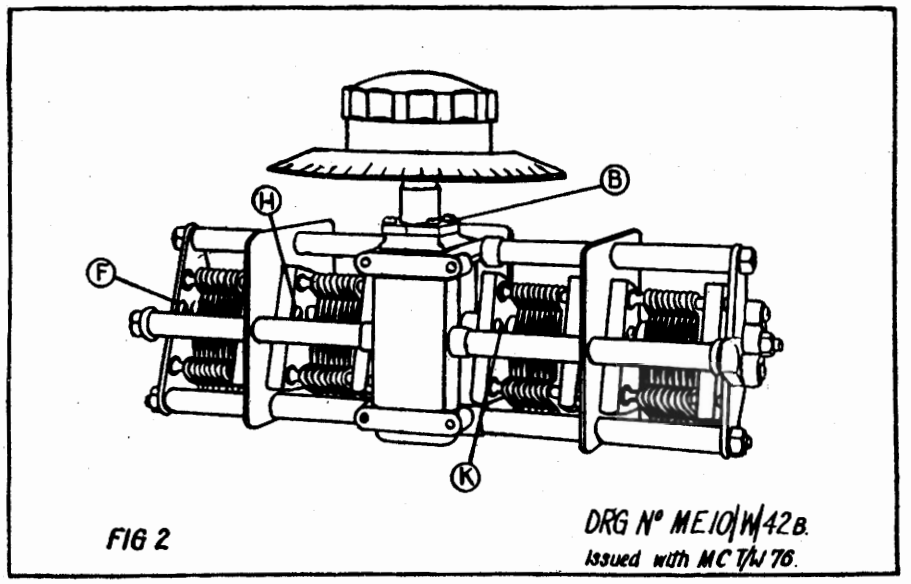



FIGURE 2.—Another view of main tuning assembly.

(6) Remove four screws retaining gear case top cover Figure 1 (A) and four screws retaining gear case cover Figure 2 (B).

(7) Bind a single loop of #12 B & S copper wire across teeth of large gear wheel Figure 1 (C) to retain the two halves in position; remove drive spindle Figure 1 (D) complete with thrust spring and two washers.

(8) Slacken off bearing screws Figure 1 (E) and remove three nuts from each plate.

(9) Remove two screws securing outer stator insulator bars to end plates Figure 2 (F).

(10) Remove end plates and spacing pieces, Figure 1 (G).

(11) Loosen Allen set screws securing outer rotors Figure 1 (M) to spindle and remove rotors taking care not to distort vanes.

(12) Remove screws securing inner stator insulator bars to screens Figure 2 (H).

(13) Remove screens complete with outer stators attached Figure 1 (I) and spacing pieces Figure 1 (J).

(14) Remove screws securing inner stator insulator bars Figure 2 (K) to gear box.

(15) Remove inner stators Figure 1 (L).

(16) Loosen Allen set screws securing inner rotors Figure 1 (N) to spindle and remove rotors, taking care not to distort vanes.

(17) Mark the spindle where it emerges from either side of the gear box.

(18) Loosen set screws securing large gear wheel to spindle and remove spindle from gear housing. Insure that gear wheel does not fall out in so doing as this is a diecasting and must be handled carefully. If spindle is badly seized it may be necessary to drive it out. To do this grip the gear box in a vise and use a punch ground to fit the contours of the spindle bearing surface.

(19) The spindle should now be set up in a lathe between centers and its diameter reduced by .002" between the two marks previously made in step (17). Under no circumstances should .002" be exceeded.

(20) The spindle should now be thoroughly cleaned and then immersed in a bath consisting of equal parts of paraffin wax and beeswax heated to a temperature of 250° to 300° F.

(21) Clean out the gear box and wipe the bearing surfaces free of all dirt.

(22) Reassemble the sections in reverse order but *do not* tighten any set screws until the bearing screws have been adjusted.

(23) The end plates have been assembled into position and the securing nuts tightened, locate spindle centrally between the bearings by slackening off one bearing screw and tightening the other until all end play is just taken up, leaving spindle to rotate quite freely between the centers. It is important that bearing screws are not overtightened, otherwise there will be danger of cracking the bearing insulators.

(24) Each rotor should now be lined up with

its respective stator, insuring that the vanes are located centrally. Tighten all rotor set screws. It is most important in doing this to see that the position of any one stator relative to the remainder is the same. This is best accomplished by lining up at maximum capacity with the "toes" (front edges) of the vanes in line. (An electrical test for this mechanical alignment will be made later and any slight adjustment can be made then.)

(25) Replace drive spindle with thrust spring and washers and secure cover in position with the four screws. Remove binding wire from large gear wheel; replace gear box cover temporarily.

(26) Locate rotor vanes so that "toes" are approximately $\frac{3}{16}''$ below "toes" of stators (i. e., just over the maximum capacity position). Rotate drive spindle clockwise until stop operates; remove gear box lid and tighten set screws in large gear wheel. These set screws are hardened steel and *must not* be overtightened, otherwise they will puncture the bakelite insulation of the spindle.

(27) Check with an ohmmeter for short circuits between vanes and for breakdown of spindle insulation.

(28) Set the rotors in line with stators at maximum capacity and fit dial to spindle. If dial has not been disturbed it should be still indicating more in one window; this window should be at the top before set screws are tightened. If the setting has been disturbed, before fitting rotate inner portion of dial until zero appears in one of the windows.

(29) Insert petroleum jelly into gear box and refit lid.

(30) Check operation of stops; stops should operate approximately 3° either side of maximum and minimum dial indications.

(31) Each section should now be checked for capacity and should give results as follows:

Maximum capacity—226 mmfd. ±5%

Minimum capacity—1212 mmfd. ±1 mmfd.

| *Dial setting ±2 divisions* | *Capacity mmfd.* |
|---|---|
| 450 | 18.0 |
| 350 | 36.5 |
| 250 | 65.0 |
| 150 | 108.0 |
| 50 | 169.0 |

If the vanes have been lined up accurately as described in step (24) these figures should be obtained without difficulty; any major discrepancies will indicate bad mechanical alignment and action should be taken to correct this. Small discrepancies may be rectified by *slight* bending of the outer rotor vanes in the affected section.

(32) The dial should now be removed and the unit reassembled into chassis, screwed into position and all leads replaced. The dial should then be refitted as described in step (28), and finally the coil screening box and base of chassis reassembled.

(33) The r-f circuits should now be checked for alignment as detailed in the instruction manual.

●

## INCREASING THE AUDIO OUTPUT OF MODEL RAS EQUIPMENTS WHEN USING HEADTELEPHONES

The audio output of the models, RAS, RAS–1, RAS–2, RAS–3 and RAS–4 when using headtelephones may be increased materially by means of a simple modification to the audio amplifier output circuit.

This modification consists of removing from the circuit the 300-ohm resistor R–138 shunted across the primary of the audio output transformer T–105.

After the above modification has been acomplished, the instruction book should be corrected accordingly—*Suggested by D. McC., NRL*

●

## INSTALLATION OF TYPE CME 50063 PRESELECTOR ON MODEL RAS EQUIPMENTS

The Norfolk Navy Yard has developed a unique method of mounting the type CME 50063 preselector for use with the model RAS series receiver. This method of mounting offers the advantages of short leads between equipments, pleasing appearance, compact installation, ease of operation, control of both equipments on a single a-c switch, etc.

A standard relay rack panel is drilled to accommodate the dial and knobs of the preselector and the unit is installed behind the panel as

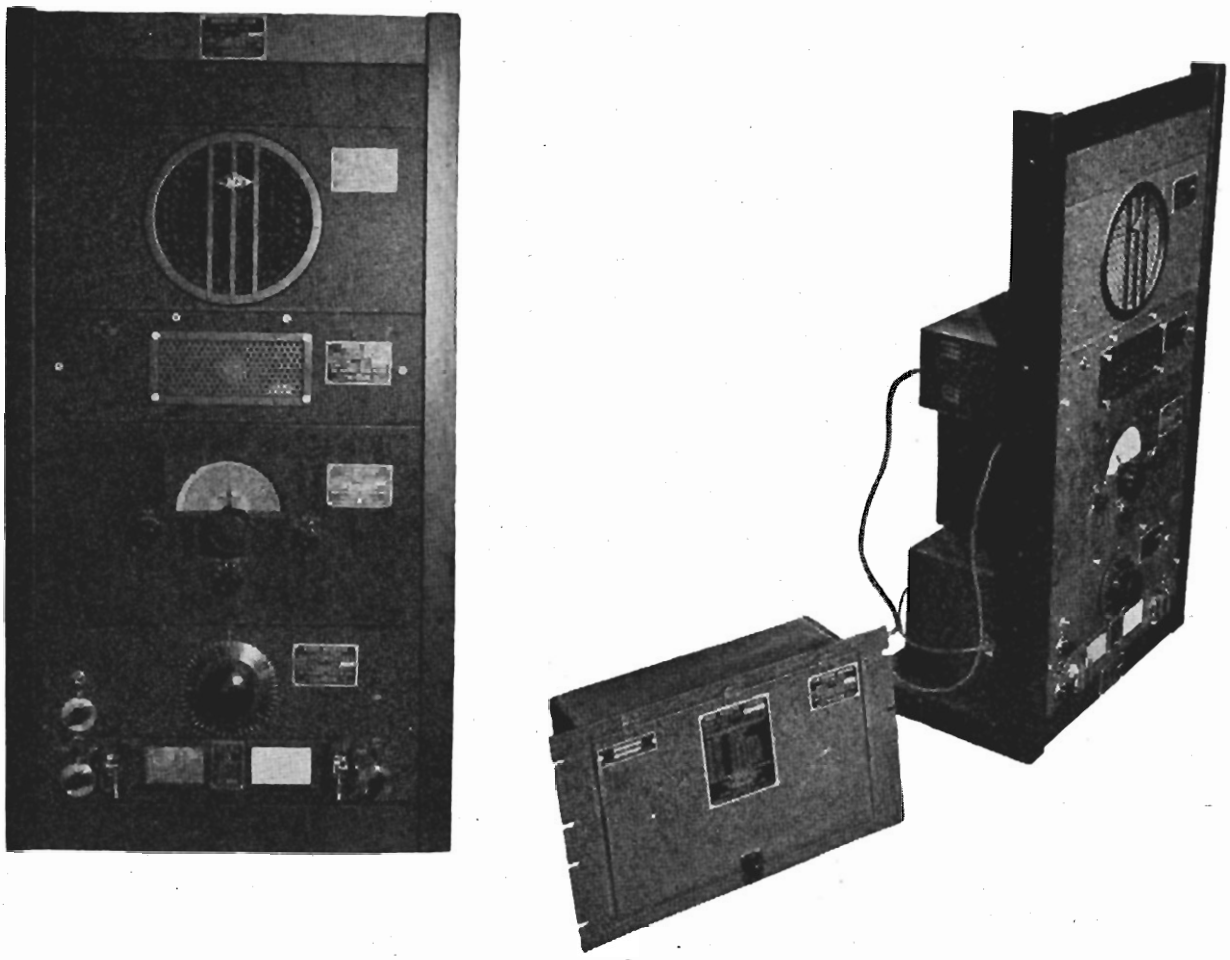


FIGURE 1.—Installation of 50063 preselector.

shown in Figure 1. The coil container is removed from the rack and installed elsewhere in a convenient location.

The type CME 50063 preselector is required with the model RAS series receiver to improve the sensitivity and eliminate radiation from the receiver's local oscillator. It is not supplied as a part of the RAS equipment.

●

## FAILURE OF OUTPUT TERMINAL STRIP IN MODEL RAS SERIES EQUIPMENTS

The U.S.S. *PC1122* reports failure of the insulated tip jack strip E–107. The casualty consisted of arcing between the tip jacks and between the tip jacks and ground. The arcing caused the strip to become carbonized, resulting in a permanent leakage path.

This difficulty may be prevented by a periodic cleaning of the terminal strip with carbon tetrachloride, as the collection of dust and dirt on the strip facilitates breakdown of the insulating surface of the strip.

If the arcing has occurred, a temporary repair may be made by thoroughly scraping the carbonized area with a sharp knife. Care should be taken to remove all of the carbon from the area as any unremoved carbon facilitates another breakdown. A thin coating of Glyptol or other insulating varnish may be applied to moisture-proof the exposed surface. The terminal strip should be replaced at the first opportunity.

●

## REPLACING TUBES IN MODEL RAS SERIES RECEIVERS

When replacing tubes in the model RAS series receiver, care should be taken to see that the types 38636 (6C6) and types 38646 (6D6) are inserted in the proper sockets.

The type 38636 (6C6) is a sharp cut-off pentode tube. In the model RAS receiver, three type 6C6 tubes are used—one as mixer, another as a c-w beat oscillator, and the third as a high-frequency oscillator. The type 38646 (6D6) is a remote cut-off pentode tube. In the model RAS receiver four type 6D6 tubes are used—two as radio-frequency and two as intermediate-frequency amplifiers.

The type 6C6 and type 6D6 tubes are *not* interchangeable.

●

## CHANGING COILS IN MODEL RAS SERIES RECEIVERS

When changing coils in the model RAS series receivers, the plate voltage should be removed from the receiver before the old coil is removed and should not be turned on again until the new coil is in place and dogged down. Plate voltage may be removed by the use of switch S–103 located directly above the r-f gain control on the front panel. This procedure eliminates the sparking at the coil terminals produced by the interruption of the plate circuits.

●

## → ERROR IN MODEL RAS–3 NAMEPLATES

The Bureau has received a number of radio failure reports which give the contract number for model RAS–3 receivers as NOs–99477. Investigation by the contractor discloses that this number is in error on all nameplates used with the model RAS–3 receiver. *The correct contract designation is NOs–94477* and appropriate correction should be made on all RAS–3 nameplates.—*10/1/45* ←

●

## MODEL RAS SERIES TROUBLE SHOOTING NOTES

| Difficulty Encountered | Cause and Remedy |
|---|---|
| Static and howling when underway. | Poor connection between plug-in coil and receiver. Contact fingers may be carefully bent to provide better contact. The contacts and coil fingers may be polished with a pencil eraser followed by thorough washing with carbon tetrachloride.—U. S. S. *Thornton* |
| RAS–3.—Failure of power transformer T–201. V–201 filament winding shorted to high-voltage filament winding. | Cause of failure believed due to faulty fuse holder. Fuse clips were broken and fuses were lying loosely in holder. Fuses would partially make and break connection as ship vibrated, the resulting surges contributing to the overheating of the transformer. Suggested remedy: close inspection of fuse holder when cleaning set to see that fuses are in tightly and are held correctly. |
| Receiver was operating, but gradually lost its sensitivity. | Tube V–108 screen bypass capacitor C–127 and B-minus-to-chassis bypass capacitor C–138 shorted. Resistor R–118 developed a high resistance. Replaced these faulty parts and set operated normally.—*U. S. S. NAAF* Navy #401 |
| Power supply becomes "hot and smokes". | Power transformer burned out. Completely rewired power supply and replaced power transformer. Operation satisfactory.—U. S. S. *Curtiss* |
| → RAS–3.—Continuous a-v-c action when a-v-c switch S–102 set to VOICE and C-W positions. | Found to be due to defective switch S–102. Repair effected by replacement of switch.—*U. S. S. PC–580* |
| RAS–3.—Rapid frequency shift or wobble in c-w beat oscillator. | Found poor connection between rotors of C–144 and C–145. Resoldered.—*U. S. S. PC–580* ← |

## TYPE CABL–74039 PORTABLE FREQUENCY STANDARD FOR CALIBRATION AT AUDIO FREQUENCIES OF RAU OR AN/FMQ–1A RADIOSONDE RECEIVING AND RECORDING EQUIPMENT

The type CABL–74039 portable frequency standard (shown in Figures 1 and 2) is used to calibrate the frequency meter and recorder of RAU or AN/FMQ–1A radiosonde ground equipment. One portable frequency standard has been shipped marked FOR AEROLOGICAL OFFICER to all shore based radiosonde stations. This PFS will be retained by the Aerological Officer as a component of the radiosonde equipments. For shipborne and newly established shore installations one PFS has been shipped to the Electronics Officer at all Navy Yards, Electronic Pools, and Branch Electronic Pools. These will remain in the custody of the Electronics Officers.

→ In addition, one PFS has been shipped to each of the following Electronics Repair Ships, marked for "Commanding Officer (ATT: ELECTRONICS OFFICER)":

Figure 1.—CABL–74039 portable frequency standard–external view.

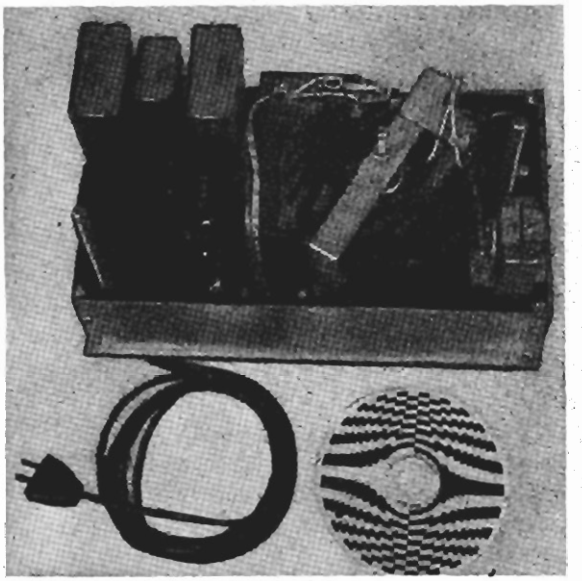


Figure 2.—CABL–74039 portable frequency standard–chassis.

| | |
|---|---|
| AG–68 | AG–74 |
| AG–69 | AG–75 |
| AG–70 | AG–76 |
| AG–71 | AG–77 |
| AG–73 | AG–78 ← |

Ship and newly established shore radiosonde installations may obtain calibration service upon request to the nearest Electronics Officer or Electronics Repair Ship. Shore based radiosonde installations will be calibrated by aerological personnel with the assistance of the cognizant Electronics Officer under whose responsibility the maintenance and repair of radiosonde equipment falls.

Policy has been established to have radiosonde ground equipment calibrated every three months except at stations not readily accessible, where the interval may be six months. In addition to these periodic checks radiosonde stations having a PFS in their custody will calibrate their equipment once each month.

In the PFS, a small synchronous clock motor is driven at constant speed from the voltage generated by a self-excited vibrating reed. A flat transparent glass disc is mounted on the shaft of the motor. The face of the disc is made up of thirteen annular rings. Each ring consists of alternate transparent and opaque

segments. A concentrated light beam is interrupted by the opaque segments on the rotating disc. The light pulses thus formed are focused on a photo-electric cell and the resulting current is amplified to produce a suitable voltage at the selected frequency.

The PFS is capable of producing a minimum output voltage of 10 volts (peak) into any load impedance from 0.1 to 1.0 megohms at 20-cycle intervals from 10 to 250 cycles. The output wave-form is intermediate between a square wave and a sinusoidal wave. The percentage accuracy of the generated frequency is constant over the entire range of operation and is within 0.2 percent of the indicated frequency.

The unit operates from a 110- to 120-volt, 50- to 60-cycle power source. This standard is designed to be independent of wide variations in power line frequency and voltage as well as temperature variations.

The PFS is a precision instrument and should be handled accordingly. It consists of delicate and fragile parts such as vacuum tubes, clock motor, and thin glass discs. Storage in a warm dry location is recommended. The unit is not tropicalized and extra precautions against moisture must be provided in tropical areas.

A schematic diagram is provided in the cover of each instrument for maintenance purposes. The synchronous clock motor is self-lubricating. *Under no circumstances should adjustment of the vibrating reed be attempted.* A spare glass disc is provided with each unit and is attached to the inside bottom of the case. If faulty operation of the PFS is suspected, a nominal frequency check may be made by comparison with the output frequency of an audio oscillator such as the LO or LAJ. It should be noted, however that the accuracy of these oscillators may be less than that of the PFS. A more accurate check might be made using an oscilloscope and comparing the 110-cycle output with the WWV standard audio-frequency transmission of 440 cycles.

Calibration procedure is as follows:

(1) The radiosonde ground equipment should be turned on with all components functioning for a "warm up" period of 30 minutes before proceeding with the calibration.

(2) On the receiver, turn down the AUDIO GAIN and REGENERATION controls to zero position.

(3) Turn the radiosonde electronic frequency meter INPUT control to position marked SC.

(4) Adjust the ZERO SETTING knob located beneath the recorder so that the recorder prints a trace, the left edge of which falls exactly on the zero line of the chart.

(5) The meter on the radiosonde electronic frequency meter panel should also read zero.

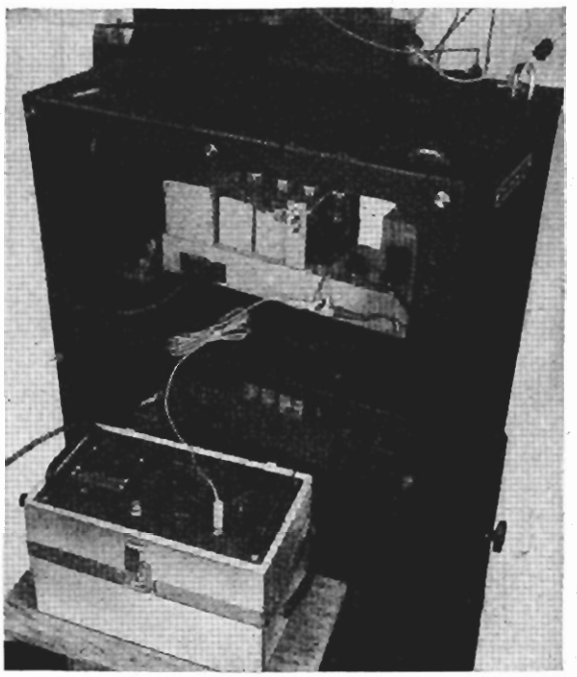


FIGURE 3.—CABL–74039 portable frequency standard attached to RAU receiver.

If not, adjust the zero setting screw on the meter with a small screw driver to obtain this value.

(6) After the preliminary adjustments above are completed, turn the radiosonde electronic frequency meter INPUT control to position X.

(7) Connect the *red* and *black* output leads of the PFS to the radiosonde receiver output terminals as shown in Figure 3. Turn on the PFS and set the selector switch to 190 CYCLES PER SECOND position. Instructions for operating the PFS are contained in the cover of the case. It should be allowed to warm up for

at least 10 minutes before attempting the calibration.

(8) With the PFS set on 190 CYCLES PER SECOND and in an operating condition, adjust the COARSE and FINE controls on the radiosonde electronic frequency meter until the recorder is printing a trace, the left edge of which falls exactly on the 95th division line of the chart. Simultaneously the meter on the radiosonde electronic frequency meter panel should also indicate 95 divisions. If not, remove the EQUALIZER cap on the electronic frequency meter panel and make the necessary adjustments until the meter reading and recorded trace value agree. Readjust the FINE control on the electronic frequency meter panel so that the recorder trace and meter reading simultaneously indicate 95 divisions. With this accomplished, the radiosonde electronic frequency meter COARSE and FINE controls *should not be touched during the remainder of the calibration.*

(9) Proceed with the actual calibration in 20-cycle intervals by adjustment of the selector switch on the PFS from 190 cycles down to 10 cycles and back up to 190 cycles. At each setting record the value indicated by the recorder trace and by the visual meter. The recorder trace value and meter reading on the electronic frequency meter panel should simultaneously indicate 95 divisions when the PFS is brought back to the 190 CYCLES PER SECOND setting at the end of the calibration. If not, this indicates that the equipment has drifted and the entire calibration, beginning with instruction (8) above, must be repeated.

(10) For each setting of the PFS from 10 to 190 cycles, the average error of the meter value and the trace value should be calculated. For example, on the standard setting of 150 cycles going down the recorder indicated 76 divisions. On the way up for the same 150-cycle setting the recorder indicated 76.8 divisions. The true reading should have been, in either case, 75 divisions. The average error is therefore $+1.0+1.8\div 2=1.4$ divisions plus. The same procedure is used for all other settings except at the 190-cycle setting where the error should be zero. The same procedure is followed for determining the average errors for the visual meter on the radiosonde electronic frequency meter panel.

If the calibration data shows that the radiosonde recorder is in error by one-third of a division or less, at any point between the 5th and the 85th division, the errors may be neglected.

If the error is between one-third and one division at a few places along the recorder and are all plus or all minus the tapper bar on the recorder may be bent slightly in or out as necessary, or the recorder meter may be moved on its base. Only personnel thoroughly familiar with the equipment should attempt this. This procedure is described on page 14 of the RAU–2 instruction book approved 11 September 1944.

If the error is greater than one division but less than two divisions anywhere along the recorder trace, or changes from a plus to a minus error, then a correction curve for the recorder must be plotted. This curve could best be plotted on a piece of recorder chart paper with recorder divisions on the abscissa and average error (calculated in paragraph (10) above) along the ordinate. This curve should then be used to determine the correct recorder division value in the computation of each significant point in daily radiosonde soundings.

Should the calibration indicate a recorder error of greater than two divisions (plus or minus), the nearest Electronics Officer should be contacted for repairs, or overhaul, as necessary.

A correction curve for the visual meter on the radiosonde electronic frequency meter panel should be drawn for errors between two tenths and two divisions as mechanical adjustments cannot be made on this meter. *11/1/45*

## TENDER SPARE PARTS FOR THE POWER PACKS OF MODELS RBA, RBB, AND RBC EQUIPMENTS

The Bureau has under procurement 200 sets of tender spare parts for the power packs of model RBA equipments. These spare parts are applicable not only to the power packs of model RBA equipments, but also to those of models RBB and RBC equipments. In addition, the Bureau has on procurement 824 sets of stock spares which are applicable to the power packs of models RBA, RBB, and RBC. Upon exhaustion of tender spare parts, the Bureau will issue these stock spare parts in lieu of tender spare parts requested by the field. All power packs for these receivers are the same, and all types of spares are 100-percent interchangeable.

Tender and stock spares for the RBA, RBB, and RBC receivers themselves are not interchangeable, and should be requested for the specific receiver required.

●

## → RBA RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 1

### INSTALLATION OF TYPE 49509 PLUG ADAPTERS

*Equipments affected.*—All model RBA through RBA–4 series radio receivers.

*Purpose.*—To adapt the audio output plug to fit the type TTHFA–1 cable specified for use in audio circuits.

*Procedure.*—The plug adaptor is to be installed in the following manner: (The numbers, in brackets, referenced throughout the text, refer to Fig. 1.)

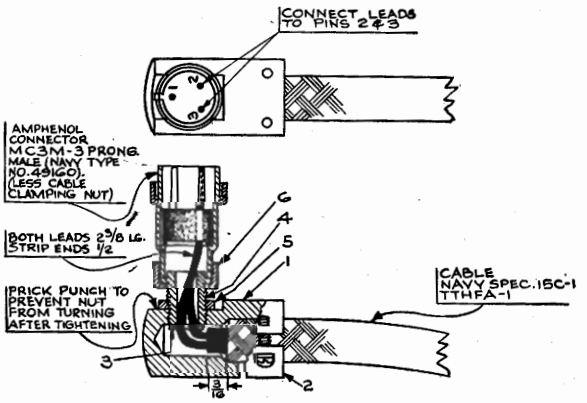



FIGURE 1.—Installation of plug adapter.

(1) Remove the cable clamping ring furnished with the plug, Navy type CPH–49160. This plug is supplied with the radio receiving equipments.

(2) Strip ½″ off the ends of the two conductors as shown in Figure 1.

(3) Insert the cable into the connector body [1] and pull the two conductors through the tapped hole in the body.

(4) Clamp the cable in place with clamp [2]. Two machine screws and lockwashers are furnished for this purpose.

(5) Insert the insulating washer [3] over the two conductors and into the bottom of the tapped hole in the conductor body [1]. (See Fig. 1.)

(6) Assemble bushing [4], locknut [5], coupling nut [6] and plug, Navy type CPH–49160. Insert the conductor leads into pins no. 2 and no. 3, as shown in Figure 1.

(7) Before tightening the locknut [5] note positions of the key and connections. Be sure that the positions agree with Figure 1. Tighten the locknut [5].

(8) Prick-punch the connector body adjacent to the locknut [5] to prevent it from turning.

(9) Solder leads to pins no. 2 and no. 3.

*General.*—Correspondence received in the Bureau indicates that the type 49509 plug adapter kits are not being utilized in every instance as originally intended. The kits are required to adapt the audio output plug, furnished with the above receivers, to fit the type TTHFA–1 cable specified for use in audio circuits.

Kits have been distributed, under contract NXsr–39245, to the various Electronic Pools in quantities equal to the number of receivers for which they are required. Until later models are available, the issuing Supply Officers for Radio should ascertain that a type 49509 adapter kit accompanies each receiver for which it is required. Vessels are requested to contact an Electronics Officer at the earliest opportunity for the installation of the plug adapter.

Instruction books should be corrected accordingly. A record of completion of this

change should be made on the ship's Radio Equipment Log, NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card.—*1/1/46*

●

## RBA RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 2

### INVERSION OF POWER SUPPLY FILTER CHOKE (NO KIT)

*Equipments affected.*—RBA receivers with power units having the following serial numbers:

| | |
|---|---|
| 1– 451; incl. | 2261–2263, incl. |
| 488– 492, incl. | 2265 |
| 801– 802, incl. | 2267–2269, incl. |
| 804– 844, incl. | 2270 |
| 846 | 2272–2274, incl. |
| 848– 850, incl. | 2276–2279, incl. |
| 852– 901, incl. | 2281 |
| 907 | 2286 |
| 1601–1695, incl. | 2289 |
| 1800–1819, incl. | 2293 |
| 1821–1872, incl. | 2295–2296, incl. |
| 1874–1899, incl. | 2298–2299, incl. |
| 1900–1998, incl. | 2303–2305, incl. |
| 2000–2008, incl. | 2307 |
| 2012–2016, incl. | 2309–2310, incl. |
| 2018–2021, incl. | 2313–2314, incl. |
| 2025 | 2316–2317, incl. |
| 2028–2033, incl. | 2320–2321, incl. |
| 2038 | 2323–2326, incl. |
| 2041 | 2328–2336, incl. |
| 2050–2051, incl. | 2340–2341, incl. |
| 2058 | 2345 |
| 2062 | 2347–2351, incl. |
| 2069 | 2353 |
| 2071–2075, incl. | 2355–2399, incl. |
| 2078–2079, incl. | 2400–2402, incl. |
| 2172 | 2404–2416, incl. |
| 2213 | 2418–2471, incl. |
| 2238 | 2473–2499, incl. |
| 2241 | 2500–2527, incl. |
| 2245–2246, incl. | 2529–2548, incl. |
| 2249 | 2550–2589, incl. |
| 2251–2253, incl. | 2591–2600, incl. |
| 2255–2257, incl. | |

*Attention is invited to the fact that the serial numbers listed above are the serial numbers of the type CRV–20130 power units, not the serial numbers of the associated receivers.*

*Purpose.*—To prevent the possibility of shorting of the filter choke or grounding of the the high-voltage output of the power pack.

*Procedure.*—This change consists of merely inverting the type CRV–30788 filter choke.

*General.*—One of the most frequent troubles encountered in models RBA equipments is failure of the type CRV–20130 power supply unit. The difficulty usually encountered is a shorting of the filter chokes or grounding of the high-voltage output of the power pack. It is caused by the melting of the wax potting compound of the type CRV–30788 filter choke due to the high temperature inside the unit. Softening of the wax potting compound permits the coil assembly to settle and make contact with the terminal studs to which it is connected, resulting in either the shorting of the choke or grounding of the terminal studs and consequent failure of the unit.

The contractor has taken steps to eliminate this difficulty, and in future production of the power supply unit this trouble will not be encountered. The improved chokes were installed in all equipments shipped by the contractor after 18 January 1943. The equipments shipped prior to that date were not entirely in serial number sequence.

In the inverted position, the chokes are not subject to casualty when melting occurs because the choke coil assembly simply comes to rest on the bottom of the container. It has been found that there is no strain or pull exerted on the connecting wires between the choke coil itself and the terminal studs in the case of inverted chokes where the coil assembly drops to the bottom of the container.

In the event that equipments having improved chokes (serial numbers not given above) have already been modified by inverting the filter chokes, no action need be taken to return the equipments to their original condition as inverting the chokes produces no change in the operation or function of the equipments.

The contractor is supplying a quantity of improved chokes for use in replacing those shorted or damaged. These are being supplied to the various Electronic Pools, and do not require inversion.

This change is within the scope of the ship's force and should be completed at the first opportunity. Record of completion of this change should be made on the ship's Radio Equipment Log, NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *1/1/46.*

➜

## MODEL RBA SERIES TROUBLE SHOOTING NOTES

| Difficulty Encountered | Cause and Remedy |
|---|---|
| Failure of filter chokes L–405 or L–406. | The faulty unit should be taken apart and a repair attempted. In the majority of cases the core of the choke has either shorted across the contacts or shorted a contact to ground. A repair can be effected by insulating these contacts thoroughly from each other and from the core of the coil. If the coil has had time to "burn out" this repair will not be successful. In this case, a *temporary substitute* for the component can be effected by using a 400-ohm 50-watt resistor. The voltage output remains the same and the hum output will not increase noticeably. This procedure is recommended *only as an emergency repair* measure. Failures due to internal shorts may be prevented by adapting the procedure described on page RBA:1. |
| Weak signals. | Set screws on coupling from main tuning dial to auxiliary gain control, R–128, were found loose. R–128 was set to proper operating value and coupling secured.—U. S. S. *Chandeleur* |
| Failure of 250-volt d-c meter, M–101. | Usually traced to the multiplier, which may be temporarily replaced with a resistor of higher wattage, the resulting error depending on the accuracy of the replacement. |
| Weak signals. | Cold-solder joint at antenna connection.—*U. S. Naval Station, Navy 129* |
| Weak signals. | Type 6SK7, third r-f tube shorting between elements after warming up.—*U. S. Naval Station, Navy 129* |
| Poor operation of low-frequency receivers, such as RAO, RBA and RAK when operated in parallel on the same antenna with a high-frequency receiver, such as the RBL, RBB, RBC and RAL. | This is due to the fact that the input impedance of the antenna circuit of high-frequency receivers is very low and, hence, practically short circuits the antenna to ground leaving little signal for the low-frequency receiver with its high input impedance. The best solution is to provide separate antennas for low- and high-frequency receivers. If conditions are such as to prevent this, the receivers may be decoupled by inserting a condenser in series with the antenna connection of the high-frequency receiver. The decoupling impedance may be mounted inside the junction box on the "Boston" line. |
| → RBA.—Failure of dial lamps to light. | Found that cause was the shorting of the lamp holder to the chassis.—U. S. S. *Scribner* (APD–122) |
| RBA–1.—Intermittent operation. | Found poor solder joint on sockets for V–102 and V–107.—U. S. S. *Stack* (DD–406) ← |



664451°—45——3

## TENDER SPARE PARTS FOR THE POWER PACKS OF MODEL RBB EQUIPMENTS

See the article entitled "Tender Spare Parts for the Power Packs of Models RBA, RBB, and RBC Equipments," on page RBA : 2.

●

## ERROR IN INSTALLATION INSTRUCTIONS FOR PANORAMIC COUPLING KITS FOR MODELS RBU/RBV PANORAMIC ADAPTORS FOR USE WITH MODELS RBB/RBC RECEIVERS

The following change should be made to the subject instruction books (NAVSHIPS 900, 501 IB) :

(1) Section 1, Page 1–1, Paragraph 2, Sub Item B—Change the RCA drawing reference from K–870738 to K–890738.

●

## → RBB RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 1

### INSTALLATION OF TYPE 49509 PLUG ADAPTERS

*Equipment affected.*—All model RBB through RBB–2 series radio receivers.

*Purpose.*—To adapt the audio output plug to fit the type TTHFA–1 cable specified for use in audio circuits.

*Procedure.*—The plug adapter is to be installed in the following manner: (The numbers, in brackets, referenced throughout the text, refer to Fig. 1).

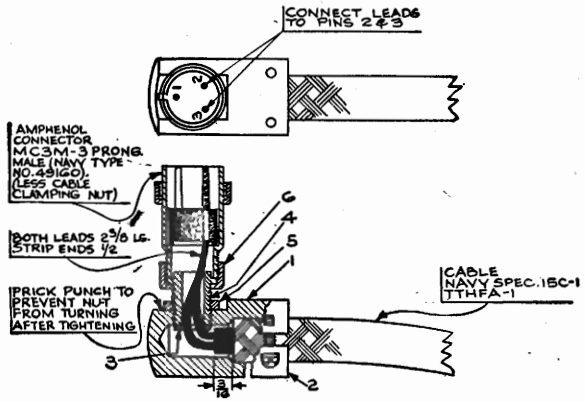



FIGURE 1.—Installation of plug adapter.

(1) Remove the cable clamping ring furnished with the plug, Navy type CPH–49160. The plug is supplied with the radio receiving equipments.

(2) Strip ½″ off the ends of the two conductors as shown in Figure 1.

(3) Insert the cable into the connector body [1] and pull the two conductors through the tapped hole in the body.

(4) Clamp the cable in place with clamp [2]. Two machine screws and lockwashers are furnished for this purpose.

(5) Insert the insulating washer [3] over the two conductors and into the bottom of the tapped hole in the conductor body [1]. (See Fig. 1.)

(6) Assemble bushing [4], locknut [5], coupling nut [6] and plug, Navy type CPH–49160. Insert the conductor leads into pins no. 2 and no. 3, as shown in Figure 1.

(7) Before tightening the locknut [5] note positions of the key and connections. Be sure that the positions agree with Figure 1. Tighten the locknut [5].

(8) Prick-punch the connector body adjacent to the locknut [5] to prevent it from turning.

(9) Solder leads to pins no. 2 and no. 3.

*General.*—Correspondence received in the Bureau indicates that the type 49509 plug adapter kits are not being utilized, in every instance as originally intended. The kits are required to adapt the audio output plug, furnished with the above receivers, to fit the type TTHFA–1 cable specified for use in audio circuits.

Kits have been distributed, under contract NXsr–39245, to the various Electronic Pools in quantities equal to the number of receivers for which they are required. Until later models are available, the issuing Supply Officers for Radio should ascertain that a type 49509 adapter kit accompanies each receiver for which it is required. Vessels are requested to contact an Electronics Officer at the earliest opportunity for the installation of the plug adapter.

Instruction books should be corrected accordingly. A record of completion of this change should be made on the ship's Radio Equipment Log, NAVSHIPS 900,039. Com-

pletion of this change should be reported on the NBS–383 card. *1/1/46*

●

## RBB RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 2

### INVERSION OF POWER SUPPLY FILTER CHOKE (NO KIT)

*Equipments affected.*—RBB receivers with power units having the following serial numbers:

| | |
|---|---|
| 1–451, incl. | 2261–2263, incl. |
| 488–492, incl. | 2265 |
| 801–802, incl. | 2267–2269, incl. |
| 804–844, incl. | 2270 |
| 846 | 2272–2274, incl. |
| 848–850, incl. | 2276–2279, incl. |
| 852–901, incl. | 2281 |
| 907 | 2286 |
| 1601–1695, incl. | 2289 |
| 1800–1819, incl. | 2293 |
| 1821–1872, incl. | 2295–2296, incl. |
| 1874–1899, incl. | 2298–2299, incl. |
| 1900–1998, incl. | 2303–2305, incl. |
| 2000–2008, incl. | 2307 |
| 2012–2016, incl. | 2309–2310, incl. |
| 2018–2021, incl. | 2313–2314, incl. |
| 2025 | 2316–2317, incl. |
| 2028–2033, incl. | 2320–2321, incl. |
| 2038 | 2323–2326, incl. |
| 2041 | 2328–2336, incl. |
| 2050–2051, incl. | 2340–2341, incl. |
| 2058 | 2345 |
| 2062 | 2347–2351, incl. |
| 2069 | 2353 |
| 2071–2075, incl. | 2355–2399, incl. |
| 2078–2079, incl. | 2400–2402, incl. |
| 2172 | 2404–2416, incl. |
| 2213 | 2418–2471, incl. |
| 2238 | 2473–2499, incl. |
| 2241 | 2500–2527, incl. |
| 2245–2246, incl. | 2529–2548, incl. |
| 2249 | 2550–2589, incl. |
| 2251–2253, incl. | 2591–2600, incl. |
| 2255–2257, incl. | |

*Attention is invited to the fact that the serial numbers listed above are the serial numbers of the type CRV–20130 power units, not the serial numbers of the associated receivers.*

*Purpose.*—To prevent the possibility of shorting of the filter choke or grounding of the high-voltage output of the power pack.

*Procedure.*—This change consists of merely inverting the type CRV–30788 filter choke.

*General.*—One of the most frequent troubles encountered in models RBA equipments is failure of the type CRV–20130 power supply unit. The difficulty usually encountered is a shorting of the filter chokes or grounding of the high-voltage output of the power pack. It is caused by the melting of the wax potting compound of the type CRV–30788 filter choke due to the high temperature inside the unit. Softening of the wax potting compound permits the coil assembly to settle and make contact with the terminal studs to which it is connected, resulting in either the shorting of the choke or grounding of the terminal studs and consequent failure of the unit.

The contractor has taken steps to eliminate this difficulty, and in future production of the power supply unit this trouble will not be encountered. The improved chokes were installed in all equipments shipped by the contractor after 18 January 1943. The equipments shipped prior to that date were not entirely in serial number sequence.

In the inverted position, the chokes are not subject to casualty when melting occurs because the choke coil assembly simply comes to rest on the bottom of the container. It has been found that there is no strain or pull exerted on the connecting wires between the choke coil itself and the terminal studs in the case of inverted chokes where the coil assembly drops to the bottom of the container.

In the event that equipments having improved chokes (serial numbers not given above) have already been modified by inverting the filter chokes, no action need be taken to return the equipments to their original condition as inverting the chokes produces no change in the operation or function of the equipments.

The contractor is supplying a quantity of improved chokes for use in replacing those shorted or damaged. These are being supplied to the

various Electronic Pools, and do not require inversion.

This change is within the scope of the ship's force and should be completed at the first opportunity. Record of completion of this change should be made on the ship's Radio Equipment Log, NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *1/1/46*

●

## RBA RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 3

### IMPROVEMENT OF BAND SWITCH

*Equipments affected.*—All model RBB and model RBB–1, serial No. 1 through No. 1000, radio receivers.

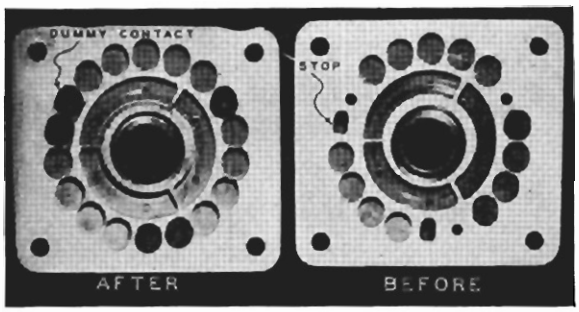



FIGURE 1.—RBB/RBC receivers band switch stators—before and after modification

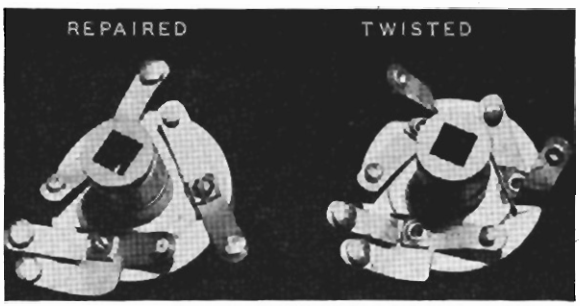



FIGURE 2.—RBB/RBC receivers band switch rotors—twisted and repaired.

*Purpose.*—To prevent the band switch rotor contacts from twisting.

*Procedure.*—Equipments should be modified as shown in the accompanying photographs, Figures 1 and 2. The modification, which was suggested by C. E. Swiger, RT 1/c of the U. S. S. *Cascade* (AD–16), consists of removing the stop pins and filling the holes on the band switch with plugs made of bakelite or other suitable insulating material. The plugs should be made as shown, having approximately the same top dimensions as the switch contact points. It is believed that the photographs are self-explanatory.

*General.*—The Bureau has received numerous failure reports covering failure of the band change switches in model RBB receivers. In most cases failure is due to "heavy handedness" or carelessness of operating personnel in turning the band switch beyond its allotted range and thus bending the contacts.

The contractor for these equipments has designed an improved band change switch which allows continuous rotation and thus eliminates the cause of the failure. The improved wave band switches were incorporated in production equipments as follows:

Contract NOs–91265, supplement A:
Model RBB–1 series, serial numbers 1001 through 2000, inclusive.

Contract NOs–91265, supplement B:
Model RBB–1 series, serial numbers 2001 through 2839, inclusive.

Contract NXss–17001:
Model RBB–2 series, serial numbers 1 through 1000, inclusive.

Improved switches will be included in all future production of RBB series equipments. Field activities are requested to advise the Bureau by separate correspondence in addition to the failure report NBS–383 of failure of the improved wave band switches in the above equipments.

This change is within the scope of the ship's force and should be completed at the first opportunity. Record of completion of this change should be made on the ship's Radio Equipment Log, NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. 1/1/46.

←

●

## MODEL RBB SERIES TROUBLE SHOOTING NOTES

| Difficulty Encountered | Cause and Remedy |
|---|---|
| Failure of filter chokes L–405 and L–406. | The faulty unit should be taken apart and a repair attempted. In the majority of cases the core of the choke has either shorted across the contacts or shorted a contact to ground. A repair can be effected by insulating these contacts thoroughly from each other and from the core of the coil. If the coil has had time to "burn out", this repair will not be successful. In this case, a *temporary substitute* for the component can be effected by using a 400-ohm 50-watt resistor. The voltage output remains the same and the hum output will not increase noticeably. This procedure is recommended *only as an emergency repair* measure. |
| RBB–1.—Receiver dead. All voltages appeared normal. | Condenser C–376 across primary of output transformer was found to be shorted. Normal operation of the receiver was obtained when the condenser was replaced.—U. S. S. *Bush* |
| Bent or broken fingers on band switch. | An analysis of these failures indicates careless or improper handling on the part of operators, i.e. applying too much force in operating the switch so that the switch fingers are brought against the stop too forcibly, running beyond the stop, thereby causing bent and broken fingers which render the switch inoperative. |
| RBB–1.—Receiver inoperative. The receiver acted as though the antenna circuit was open; i. e. no signals, slight noise when gain control was advanced. | The Amperite regulator tube V–206 was found to be open. Normal operation was restored by replacement of the tube. This tube is Amperite type 6–8–B and is used to stabilize the heater voltage on the local oscillator tube V–103. A simple and rapid test for the opening of this regulator tube is to feel the oscillator tube and note if it is warm. Failure of the regulator opens the heater circuit and the oscillator tube remains cold. The ballast resistance is connected to pins #1 and #4 of the tube and the nominal voltage drop across the tube is 10 volts AC.—U. S. S. *Bush* |
| Failure of 250-volt d-c meter M–101. | Usually traced to the multiplier, which may be temporarily replaced with a resistor of higher wattage, the resulting error depending on the accuracy of the replacement. |
| Receiver dead, "bulls-eye" lights dimly, dial lamps not lit, shielded cable from power supply very hot, and plate voltage meter reads normal voltage. | Caused by short circuit between heater circuit and ground occurring at dial lamp socket. May be checked rapidly by removing dial lamp socket from the chassis ear. |
| RBB/RBC.—The receivers failed to work when receiving c-w signals after equipment had been dusted out or tube changes made. | Investigation disclosed that the shield cover on transformer T–306 had been displaced, causing it to short out either or both the capacitors on the top of the transformer, usually the longer one. This failure has been corrected by wrapping a suitable sized piece of light varnished cambric around each of the capacitors on top of the transformer. By doing this, it makes it impossible for these condensers to be shorted out by the shield top in any position. |

## TENDER SPARE PARTS FOR THE POWER PACKS OF MODEL RBC EQUIPMENTS

See the article entitled "Tender Spare Parts for the Power Packs of Models RBA, RBB, and RBC Equipments," on page RBA : 2.

●

## ERROR IN INSTALLATION INSTRUCTIONS FOR PANORAMIC COUPLING KITS FOR MODELS RBU/RBV PANORAMIC ADAPTORS FOR USE WITH MODEL RBC RECEIVERS

See the article of similar title on page RBB : 2 of this bulletin.

●

## → RBC RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 1

### INSTALLATION OF TYPE 49509 PLUG ADAPTERS

*Equipments affected.*—All model RBC through RBC–2 series radio receivers.

*Purpose.*—To adapt the audio output plug to fit the type TTHFA–1 cable specified for use in audio circuits.

*Procedure.*—The plug adaptor is to be installed in the following manner: (The numbers, in brackets, referenced throughout the text, refer to Fig. 1).

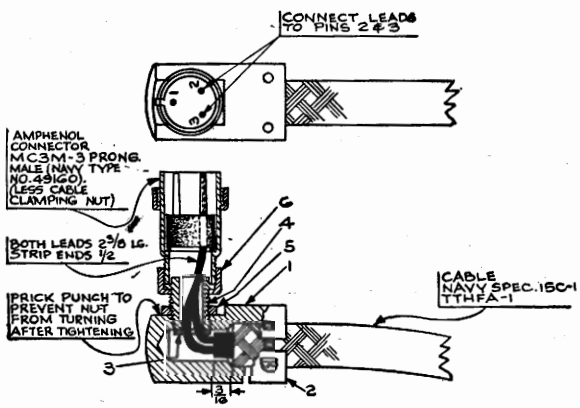



FIGURE 1.—Installation of plug adapter.

(1) Remove the cable clamping ring furnished with the plug, Navy type CPH–49160. The plug is supplied with the radio receiving equipments.

(2) Strip ½" off the ends of the two conductors as shown in Figure 1.

(3) Insert the cable into the connector body [1] and pull the two conductors through the tapped hole in the body.

(4) Clamp the cable in place with clamp [2]. Two machine screws and lockwashers are furnished for this purpose.

(5) Insert the insulating washer [3] over the two conductors and into the bottom of the tapped hole in the connector body [1]. (See Fig. 1.)

(6) Assemble bushing [4], locknut [5], coupling nut [6] and plug, Navy type CPH–49160. Insert the conductor leads into pins no. 2 and no. 3 as shown in Figure 1.

(7) Before tightening the locknut [5] note positions of the key and connections. Be sure that the positions agree with Figure 1. Tighten the locknut [5].

(8) Prick-punch the connector body adjacent to the locknut [5] to prevent it from turning.

(9) Solder leads to pins no. 2 and no. 3.

*General.*—Correspondence received in the Bureau indicates that the type 49509 plug adapter kits are not being utilized, in exery instance, as originally intended. The kits are required to adapt the audio output plug, furnished with the above receivers, to fit the type TTHFA–1 cable specified for use in audio circuits.

Kits have been distributed, under contract NXsr–39245, to the various Electronic Pools in quantities equal to the number of receivers for which they are required. Until later models are available, the issuing Supply Officers for Radio should ascertain that a type 49509 adapter kit accompanies each receiver for which it is required. Vessels are requested to contact an Electronics Officer at the earliest opportunity for the installation of the plug adapter.

Instruction books should be corrected accordingly. A record of completion of this change should be made on the ship's Radio Equipment Log, NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *1/1/46*

●

## RBC RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 2

### INVERSION OF POWER SUPPLY FILTER CHOKE (NO KIT)

*Equipments affected.*—RBC receivers with power units having the following serial numbers:

| | |
|---|---|
| 1–451, incl. | 2261–2263, incl. |
| 488–492, incl. | 2265 |
| 801–802, incl. | 2267–2269, incl. |
| 804–844, incl. | 2270 |
| 846 | 2272–2274, incl. |
| 848–850, incl. | 2276–2279, incl. |
| 852–901, incl. | 2281 |
| 907 | 2286 |
| 1601–1695, incl. | 2289 |
| 1800–1819, incl. | 2293 |
| 1821–1872, incl. | 2295–2296, incl. |
| 1874–1899, incl. | 2298–2299, incl. |
| 1900–1998, incl. | 2303–2305, incl. |
| 2000–2008, incl. | 2307 |
| 2012–2016, incl. | 2309–2310, incl. |
| 2018–2021, incl. | 2313–2314, incl. |
| 2025 | 2316–2317, incl. |
| 2028–2033, incl. | 2320–2321, incl. |
| 2038 | 2323–2326, incl. |
| 2041 | 2328–2336, incl. |
| 2050–2051, incl. | 2340–2341, incl. |
| 2058 | 2345 |
| 2062 | 2347–2351, incl. |
| 2069 | 2353 |
| 2071–2075, incl. | 2355–2399, incl. |
| 2078–2079, incl. | 2400–2402, incl. |
| 2172 | 2404–2416, incl. |
| 2213 | 2418–2471, incl. |
| 2238 | 2473–2499, incl. |
| 2241 | 2500–2527, incl. |
| 2245–2246, incl. | 2529–2548, incl. |
| 2249 | 2550–2589, incl. |
| 2251–2253, incl. | 2591–2600, incl. |
| 2255–2257, incl. | |

*Attention is invited to the fact that the serial numbers listed above are the serial numbers of the type CRV–20130 power units, not the serial numbers of the associated receivers.*

*Purpose.*—To prevent the possibility of shorting of the filter choke or grounding of the high-voltage output of the power pack.

*Procedure.*—This change consists of merely inverting the type CRV–30788 filter choke.

*General.*—One of the most frequent troubles encountered in model RBC receiving equipments is failure of the type CRV–20130 power supply unit. The difficulty usually encountered is a shorting of the filter chokes or grounding of the high-voltage output of the power pack. It is caused by the melting of the wax potting compound of the type CRV–30788 filter choke due to the high temperature inside the unit. Softening of the wax potting compound permits the coil assembly to settle and make contact with the terminal studs to which it is connected, resulting in either the shorting of the choke or grounding of the terminal studs and consequent failure of the unit.

The contractor has taken steps to eliminate this difficulty, and in future production of the power supply unit this trouble will not be encountered. The improved chokes were installed in all equipments shipped by the contractor after 18 January 1943. The equipments shipped prior to that date were not entirely in serial number sequence.

In the inverted position, the chokes are not subject to casualty when melting occurs because the choke coil assembly simply comes to rest on the bottom of the canister. It has been found that there is no strain or pull exerted on the connecting wires between the choke coil itself and the terminal studs in the case of inverted chokes where the coil assembly drops to the bottom of the canister.

In the event that equipments having improved chokes (serial numbers not given above) have already been modified by inverting the filter chokes, no action need be taken to return the equipments to their original condition as inverting the chokes produces no change in the operation or function of the equipments.

The contractor is supplying a quantity of improved chokes for use in replacing those shorted or damaged. These are being supplied to the various Electronic Pools, and do not require inversion.

This change is within the scope of the ship's force and should be completed at the first op-

portunity. A record of completion of this change should be made on the ship's Radio Equipment Log, NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *1/1/46*

●

## RBC RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 3

### IMPROVEMENT OF BAND SWITCH

*Equipments affected.*—All model RBC and model RBC–1, serial No. 1 through No. 1000, radio receivers.

*Purpose.*—To prevent the band switch rotor contacts from twisting.

*Procedure.*—Equipments should be modified as shown in the accompanying photographs, Figures 1 and 2. The modification, which was

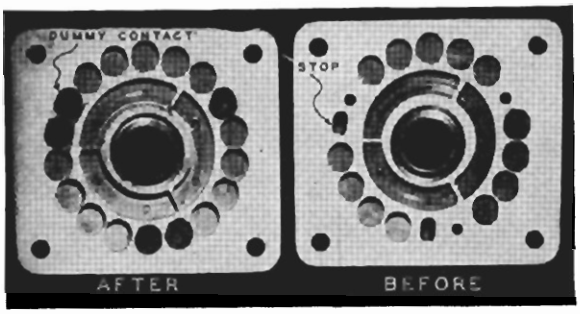



FIGURE 1.—RBB/RBC receivers band switch stators—before and after modification.

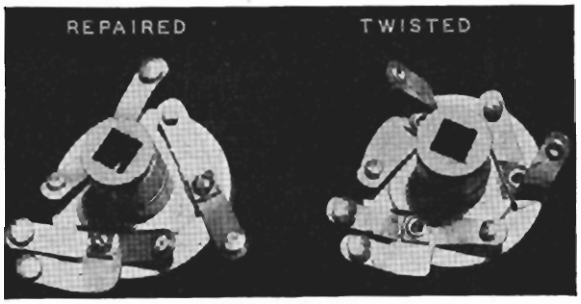



FIGURE 2.—RBB/RBC receivers band switch rotors—twisted and repaired.

suggested by C. E. Swiger, RT 1/c of the U. S. S. *Cascade* (AD–16), consists of removing the stop pins and filling the holes on the band switch with plugs made of bakelite or other suitable insulating material. The plugs should be made as shown, having approximately the same top dimensions as the switch contact points. It is believed that the photographs are self-explanatory.

*General.*—The Bureau has received numerous failure reports covering failure of the band change switches in model RBC receivers. In most cases failure is due to "heavy handedness" or carelessness of operating personnel in turning the band switch beyond its allotted range and thus bending the contacts.

The contractor for these equipments has designed an improved band change switch which allows continuous rotation and thus eliminates the cause of the failure. The improved wave band switches were incorporated in production equipments as follows:

Contract NOs–91265, supplement A:

Model RBC–1 series, serial numbers 1001 through 2000, inclusive.

Contract NOs–91265, supplement B:

Model RBC–1 series, serial numbers 2001 through 2839, inclusive.

Contract NXss–17001:

Model RBC–2 series, serial numbers 1 through 1012, inclusive.

Contract NXsr–39262:

Model RBC–2 series, serial numbers 1 through 906, inclusive.

Improved switches will be included in all future production of RBC series equipments. Field activities are requested to advise the Bureau by separate correspondence in addition to the failure report NBS–383 (rev. 3–45) of failure of the improved wave band switches in the above equipments.

This change is within the scope of the ship's force and should be completed at the first opportunity. A record of completion of this change should be made on the ship's Radio Equipment Log, NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *1/1/46* ←

●

## MODEL RBC SERIES TROUBLE SHOOTING NOTES

| Difficulty Encountered | Cause and Remedy |
|---|---|
| Failure of filter chokes L–405 or L–406. | The faulty unit should be taken apart and a repair attempted. In the majority of cases the core of the choke has either shorted across the contacts or shorted a contact to ground. A repair can be effected by insulating these contacts thoroughly from each other and from the core of the coil. If the coil has had time to "burn out" this repair will not be successful. In this case, a temporary substitute for the component can be effected by using a 400-ohm 50-watt resistor. The voltage output remains the same and the hum output will not increase noticeably. This procedure is recommended only as an *emergency repair measure.* |
| Failure of 250-volt d-c meter M–101. | Usually traced to the multiplier, which may be temporarily replaced with a resistor of higher wattage, the resulting error depending on the accuracy of the replacement. |
| Ser. 64 . . . signal would cut out with BROAD–SHARP switch in SHARP position. | Audio band pass filter L–301 shorting to ground. Replaced L–301 with spare. This filter was repaired by removing the top of the can and insulating the leads that lay on top of the tar mold.—U. S. S. *Indiana* |
| Receiver dead, but produced noise when third i-f transformer was jarred. | Found wire to third i-f primary broken at terminal lug in can and making intermittent contact. Normal operation restored by repairing connection.—U. S. S. *Cushing* |

## MODEL RBG SERIES TROUBLE SHOOTING NOTES

| Difficulty Encountered | Cause and Remedy |
|---|---|
| Receiver not capable of receiving c-w signals. Beat frequency oscillator dead. | Resistor R–136 badly burned and broken; capacitor C–132–B measured 5000 ohms to ground without tube V–107. Checked and replaced R–127. Replaced R–136 and C–132–B. Receiver then operated normally.—*NOB Newport, R. I.* |

## MODIFICATION TO SIMPLIFY OPERATION OF MODEL RBH EQUIPMENTS

The Bureau is in receipt of numerous complaints from the fleet which express dissatisfaction with the model RBH radio receiving equipment because the multiplicity of controls on the panels of these receivers makes them ill suited for their intended purpose. This equipment has been allotted to the fleet for monitoring aircraft circuits, and was intended for installation at the conning station to be used for aircraft covering circuit watch.

A series of modifications are listed below which, if accomplished, will simplify the control panel of the receiver and make it possible to use the regular conning station personnel as operators:

(1) The knobs and shaft extensions should be removed from the crystal filter controls after these controls are set to give the desired selectivity. A broad-band response is desirable so the PHASING control should be set at OFF and the SELECTIVITY control set to give the greatest background noise.

(2) The beat oscillator should be rendered inoperative and automatic-volume-control made effective at all times. This is accomplished by turning the CONTROL switch to CWO and then throwing the two toggle switches inside the cabinet associated with this switch. This makes it impossible to operate the switches with the shaft. The knob is then removed.

(3) The r-f GAIN control is made semi-adjustable. This is accomplished by removing the knob, sawing a screwdriver slot in the end of the shaft and applying a shaft lock such as the Millen type 10061. To adjust the r-f gain, it is first set at full gain and a strong station tuned in. The a-f gain is then set just below the point where the audio system begins to overload. The set is then turned off the signal, the r-f gain is set to give a tolerable noise output from the speaker, and the shaft is locked. Individual experience may suggest a more suitable method of adjustment under operating conditions.

●

## → MODIFICATION OF MODEL RBH–1 EQUIPMENTS TO PROVIDE CARRIER CONTROLLED NOISE SUPPRESSION ACTION

The following modification to provide carrier-controlled noise suppression action in the model RBH–1 radio receiver was proposed by Henry L. Fletcher, CRT (AA) (T) USNR of the U. S. S. *Eichenberger* (DE–202). This modification blocks the audio system so that no sound is heard in the loudspeaker until a carrier wave comes on. The a-v-c voltage developed by the carrier in the a-v-c tube then unlocks the audio enabling reception of the message.

In the original modification resistor R–148 and switch S–103 which were employed in the "S-meter" circuit have been used, thereby removing the S-meter from the circuit. If it is desired to retain the S-meter feature, an additional potentiometer of 1,000 ohms and an S. P. S. T. switch must be procured and mounted on the front panel on the receiver. Other parts required are:

1 8-mfd. 450-v d-c electrolytic capacitor
1 1-mfd. 400-v paper capacitor
1 10,000-ohm, 2-watt resistor
1 24,000-ohm, 2-watt resistor

The wiring in the receiver is rearranged in accordance with Figure 1, utilizing compon-

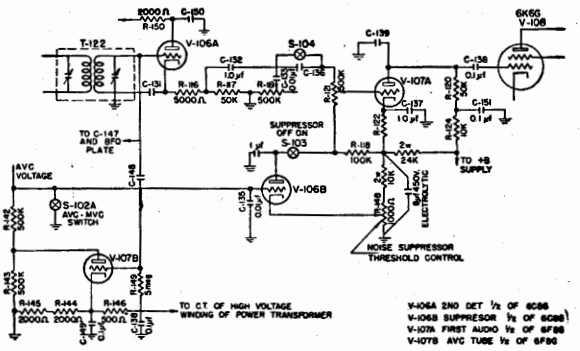



FIGURE 1.—Modification of model RBH–1 to provide carrier-controlled noise suppression action.

ents already in the receiver as required. Resistor R–148 functions as a noise suppression threshhold control or an adjustment which determines the strength of the incoming carrier necessary to unlock the audio system. Switch S–103 is used to remove the noise suppression feature if desired. The circuit is adjusted by setting the suppressor threshhold control so that atmospheric disturbances are just barely eliminated with the r-f gain full on and no carrier being received. The suppressor circuit is highly sensitive and only a very weak signal is required to trigger it. Sensitivity of the receiver may be reduced by the r-f gain control although too much reduction in gain will decrease or eliminate the a-v-c voltage and as a consequence the suppressor circuits will not unlock the audio system. ←

## MODEL RBH SERIES TROUBLE SHOOTING NOTES

| DIFFICULTY ENCOUNTERED | CAUSE AND REMEDY |
|---|---|
| Lack of a-c power. | Check fuse holders F–101 and F–102. This activity has found many of these fuse holders defective. The soldering lug connection through the middle of the hard rubber case to the inside ferrule is often not properly soldered and there is a tendency in this type of fuse holder for the lug to break off. To make repairs, the whole rear and bottom of the receiver must be removed.—*RMO Navy Yard, New York* |
| Acoustic feedback, RBH speaker to any microphone. | In this instance an RBH was used with a TBL–6. Feedback was eliminated by connecting the TBL–6 keying relay in series with the RBH speaker so that the speaker circuit was open when the transmitter key was closed.—U. S. S. *Chenango* |
| No signal output. Low plate voltage. | The lead from the primary of the coil in CF–101 had been forced against the side of the shield by gunfire, shorting the plate lead to ground. The CF–101 unit was removed and the lead insulated.—U. S. S. *Herndon* |
| Low sensitivity on certain bands. | Check for shorted trimmer condenser on band with low sensitivity. |
| Volume reduced by over fifty percent when model PD–1 voice recorder equipment was connected to model RBH receivers. | The voice recorder input transformer was grounded on one side while the output transformer of the RBH receiver was grounded at center tap. Corrected difficulty by removing ground at RBH receiver.—U. S. S. *Solomons* (CVE–67) |
| Low sensitivity on band "C". | Band switching assembly contacts found loose and dirty. This condition was cleared up by cleaning and tightening the contacts.—U. S. S. *Callaway* |
| Power system shorted; operator received shock when he touched receiver. Set insensitive. | Discovered a 6F8G tube in the 6C8G socket and a bad 6J5 tube. The line ON/OFF switch was defective and one side was grounded to the chassis. Defective tubes and switch replaced. Set operated normally.—U. S. S. *Curtiss* |
| RBH–2.—No signals at all getting through the audio-frequency stages. | Found C–189 shorted.—U. S. S. *Jaccard* (DE–355) |
| RBH–2.—Usual receiver background noise but no signals on band C. By jarring receiver, the signals would come in and out. | Found fixed capacitor in r-f coil catacomb was not soldered to catacomb contact pin. Inspection of pin indicated this. Found by opening the catacomb and prodding the leads to band C coils with insulated screwdriver.—U. S. S. *Hollandia* (CVE–97) |

## ANTENNA CONNECTION TO MODEL RBK SERIES RECEIVERS

All RBK series receivers subsequent to model RBK (no numeral) should be carefully checked upon installation or when complaints of poor reception are received to make sure that the antenna is connected to the ANTENNA post and not to the coaxial fitting on the back of the receiver. This fitting is provided for use with a panoramic adaptor.—*Navy Yard, New York*



638971—45——14

## → CORRECTION OF INSTRUCTION BOOKS FOR MODELS RBL–5 AND RBL–6 RADIO RECEIVERS

The instruction books for models RBL–5 and RBL–6 radio receivers incorrectly designate tube type 5Y3G to be used in socket X–107.

The type 5U4G rectifier tube is the correct type to use as V–107 in socket X–107. The following pages of the preliminary instruction book should be checked immediately by all personnel concerned and corrected accordingly:

Page 4—paragraph 1–7–9

Page 36—Equipment Spare Parts List

Page 40—Tender Spare Parts List

Page 48—Photograph of Tube Positions

Figure 1 is the correct diagram of the tube base. This should be copied on page 49. In the receiver, socket X–107 should be labeled correctly. The spare tubes in equipment and tender spares should be checked and tubes of the correct type should be drawn for use. *4/1/46*←

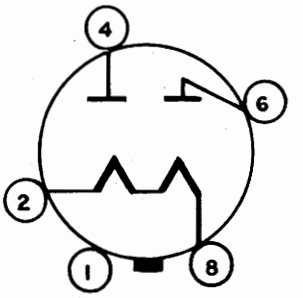



FIGURE 1.—Tube base connections for type 5U4G tubes.

## MODEL RBL SERIES TROUBLE SHOOTING NOTES

| Difficulty Encountered | Cause and Remedy |
|---|---|
| No output. | Inspection disclosed grounded antenna plug. The grounds were cleared and the receiver operated normally.—U. S. S. *Callaway* |
| RBL–2.—Intermittent drop in signal level on band "D". | Found cold-solder joint where lead from L–114 connects to lug of band switch S–107. |
| → RBL.—Transmission from TBS transmitter located adjacent to RBL made signals on RBL unreadable. | Installed r-f choke in series with antenna of RBL between antenna terminal E–102 and antenna series capacitor C–101. R-f choke consisted of 5½ microhenries 0.85 ohms d-c resistance single layer, wound on steatite core.—U. S. S. *Manitowoc* (PF–61) |
| RBL–2.—Noisy operation of receiver. | Traced to a loose screw in the second r-f stage. This screw secured a grounding wire to the chassis. Repaired by tightening screw.—U. S. S. *Acontius* (AGP–12) ← |

## BURNOUT OF CATHODE BIAS RESISTOR IN MODEL RBO SERIES EQUIPMENTS

A frequent cause of failure in the RBO is the burnout of the 680-ohm cathode bias resistor (R–145) for the type 6K6GT power-amplifier tube. This is due to inter-electrode short circuits inside the type 6K6GT power-amplifier tube.

During the early production of model RBO receivers, it became necessary to secure a quantity of type 6K6GT tubes on very short notice. A quantity of commercial tubes was available, and these tubes were obtained and used. These tubes were not built to Navy specifications and under conditions of shock and vibration frequently develop inter-electrode leakage or short circuits.

It is desired that all installation and maintenance activities remove all commercial 6K6GT tubes from model RBO receivers and replace them with Navy standard JAN 6K6GT tubes. The commercial tubes may be identified by the absence of the JAN designation and the Navy Inspector's anchor stamp.

●

## → RBO RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 1

### MODIFICATION OF THE AUDIO CIRCUIT (NO KIT)

This change is superseded by "RBO Radio Receiving Equipment—Field Change No. 3—Connecting for Balanced Line Speaker Connection." *2/1/46*

●

## RBO RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 2

### REPLACING POWER TRANSFORMER AND RECTIFIER TUBES

*Equipments affected.*—Model RBO receivers, serial numbers 1 through 3799.

*Purpose.*—To prevent failure of the power transformer due to rectifier tube failure.

*General.*—The most frequent failure in the model RBO broadcast receiver is a burned out power transformer, the burn-outs occurring in either the high-voltage winding and/or the primary. The cause of the trouble usually lies in the type 6X5GT/G rectifier tube used in the model RBO. The elements in this tube are very closely spaced and the heater-to-cathode insulation appears to be poor with the result that frequently, especially under conditions of shock, the tube develops inter-element and/or heater-to-cathode leakage or short circuits. When this occurs a severe overload is placed on the power transformer with resultant damage to or burnout of the windings.

The manufacturer has removed the cause of the trouble in equipments having serial numbers greater than 3800. The correction consists of the use of another type power transformer having a separate 5.0-volt winding for heating the rectifier tube. A type 5Y3GT/G tube is used as rectifier instead of the type 6X5 or glass equivalent.

A quantity of kits have been procured on contract NXsr–56772. Instructions for the change are included in the kit and should be kept with the instruction book for the modified equipment.

Vessels should contact an Electronics Officer at the earliest availability for the kit. The replacement is within the scope of the ship's force. A record of completion of this change should be made on the ship's "Radio Equipment Log", NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *2/1/46*

●

## RBO RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 3

### CONNECTING FOR BALANCED LINE SPEAKER CONNECTION

*Equipments affected.*—All model RBO, RBO–1 and RBO–2 series receivers.

*Purpose.*—To improve the fidelity and electrical performance of the equipment.

*General.*—This modification should be made to all model RBO series broadcast receivers by Naval shipboard installation or fitting-out activities during the initial installation period of these equipments. Modification of the receivers already installed in fleet vessels should be accomplished by ship's forces or tender forces at the first opportunity after the necessary materials are available. This modification shall not

be accomplished by commercial installation or fitting-out yards.

Where the unmodified model RBO series equipment is installed in conjunction with one or more type 49131 series speaker-amplifier units, the installation results in one-half of the input to the speakers being grounded-out. This, of course, results in low volume and poor fidelity. Also, it has been found that the present output circuit results in numerous failures of the receiver output transformers.

A quantity of kits have been procured on contract NXsr–69250. Instructions for this change are included in the kit and should be kept with the instruction book for the modified equipment.

Vessels are requested to contact an Electronics Officer at the earliest opportunity for this kit. A record of completion of this change should be made on the ship's "Radio Equipment Log", NAVSHIPS 900,039. Completion of this change should be made on the NBS–383 card. *2/1/46* ←

## MODEL RBO SERIES TROUBLE SHOOTING NOTES

| Difficulty Encountered | Cause and Remedy |
|---|---|
| No audio output. | Look for open circuit in output transformer Thordarson T–46789. |
| Output transformer primary or secondary open. | This is caused by removal of the load from the receiver's output circuit. Under the original circuit arrangement it is possible, for example, that with two model RBO receivers on board, all speaker-amplifier units are switched to receiver 1, leaving receiver 2 without a load. The remedy is to modify the RBO receiver in accordance with the instructions on page RBO : 1. This will provide a permanently connected load for the receiver. |
| "Cross talk" between channels. | Due to capacitive coupling between "hot" wires of unbalanced system. Modify RBO in accordance with page RBO : 1. Make sure that center of input transformer of speaker-amplifier or speaker-amplifier unit is grounded. |
| Weak signals in one of the speaker amplifier units (49131). | One side of the input transformer was found open. Replaced transformer.—U. S. S. *Herndon* |
| Very weak signals in monitoring phones. | Found lead wire from phone jack J–101 to resistor R–108 poorly connected to resistor. Loose strands from wire shorted out phone jack. Corrected by resoldering the wire.—U. S. S. *Refuge* (AH–11) |
| Received signal barely audible on any band. | When volume control, potentiometer R–146, was checked, one side discovered open. The other side read 0.5 megohms. The part was replaced and equipment again worked satisfactorily.—U. S. S. *Calcaterra* |
| When first turned-on, receiver operated perfectly. After a short period of time, the output suddenly dropped off. | The screen grid of V–109 (6K6GT) in the output stage was discovered to be red hot. Output tube circuits were checked with an ohmmeter and the primary of the output transformer was found to be open. Replaced the transformer, and the equipment operated normally.—U. S. S. *Libra* |
| Receiver extremely low in sensitivity on short wave bands and completely dead on the broadcast band. | The trouble was traced to a shorted C–107 cathode and screen bypass capacitor. This capacitor was replaced, resulting in normal short wave band sensitivity and excellent reception in the broadcast band.—U. S. S. *Sagittarius* |
| Equipment would work normally for a period of time, then would suddenly have a loud hum. When gear was checked for open windings, bad condensers or bad resistors, no indication of the cause of the trouble was found. | An open winding in the secondary coil of output transformer T–113 was discovered when the gear was checked in operation. It was found that after an hour or so of operation the secondary winding would open. This transformer was replaced and no further trouble was encountered.—U. S. S. *PC–1083* |
| → Low volume on broadcast band of RBO receiver. | Antenna coil burned out while operating transmitter in the same compartment. Condition can be remedied by disconnecting RBO antenna before keying transmitter.—U. S. S. *Ascella* (AK–137) |

| Difficulty Encountered | Causes and Remedy |
|---|---|
| Weak signals on broadcast band. | Trouble found to be with antenna input assembly, broadcast r–f transformer primary, and trimmer C–149. Apparently a heavy shot of r-f current had passed through units at some time, burning and melting windings of T–103 primary and shorting C–149. Replaced units with spares and realigned broadcast section. Operation returned to normal.—Charles L. Harris, RM1/c—U. S. S. *PC–580* |
| Loss of signals on all bands. | Burned plate filter R–143, and shorted plate bypass C–106–B for oscillator V–102. Replaced from spares and returned operation to normal.—Charles L. Harris, RM1/c—U. S. S. *PC–580* |
| Poor sensitivity, poor selectivity, and distortion in RBO (and RCH) receivers. | The triple .1 mfd. capacitor in the r-f stage of these receivers found to be leaky. Replaced.—Robert E. Conroy, RT3/c—U. S. S. *Sangay* (AE–10) ← |

## →FAILURE OF BAND SWITCH IN MODEL RBS RECEIVING EQUIPMENT

The U. S. S. *Boxer* (CV–21) has reported failure of band switch S–501 in the model RBS radio receiver. The selector rachet on the shaft of the switch, which is a part of the dial mechanism, came loose from the shaft so that the shaft turned freely.

All ships and stations using model RBS receivers are requested to advise the Bureau of any similar failures in order that corrective action may be taken by the manufacturer. ←

●

## DEFECTIVE COILS IN MODEL RBU–1 PANORAMIC ADAPTORS

The Radio Material Officer, Philadelphia Navy Yard, reports that several model RBU–1 panoramic adaptors have been received with defective coils. The iron cores used to tune the r-f and i-f coils were not free to turn inside the paper coil form. Consequently, the form turned as the cores were adjusted, breaking the connections from the coils to the terminal lugs on the transformer frame. Care should be taken when adjusting the coils in the subject equipments to be sure that the cores are free to rotate.

## RADIATION SUPPRESSORS FOR MODEL RCF RECEIVING EQUIPMENTS

Type CN–50174A radiation suppressors for RCF receivers have been procured on contract NXsr–55609 and are available at the following locations:

| | |
|---|---|
| GLEN–32 (41) | NYMI, RMO Disp. |
| EPIC–32 | PACT–15–41 |
| LEFT–32 | Clearfield |
| FRAY–32 | Mechanicsburg |
| DISH–32 | |

Complete instructions for installing the suppressors are supplied with the equipment.

## → REPORTS OF UNSATISFACTORY PERFORMANCE OF MODEL RCH RECEIVING EQUIPMENTS

Reports received from installation and maintenance activities frequently complain of unsatisfactory performance of the model RCH equipment upon installation. The subject of these complaints is the lack of gain, low sensitivity and frequency instability. When the Bureau of Ships assumed control of the technical aspects of the subject equipment several preliminary models were tested and found to be better than any of the other available equipments which would fill the requirements for a non-radiating, low and high frequency communications receiving equipment. The performance of this equipment will not equal that of some other Navy receivers; however, with proper handling it can be made to give satisfactory service.

These equipments were not tropicalized and were not packed for overseas shipment so deterioration may possibly result from long storage periods. Complete re-alignment of the receiver may be necessary at the time of installation. Alignment should be performed by expert personnel carefully following the instruction book procedure because there is considerable interaction between frequency bands, and one band cannot be adjusted without affecting the adjustment of the other bands. Several repetitions of the alignment procedure may be necessary to obtain the best sensitivity and gain.

Overloading on strong signals accompanied by pulling of the oscillator frequency can be prevented by maintaining the gain control settings as low as possible consistent with adequate audio output. *2/1/46*

●

## FAILURE OF PHONE CONTROL SWITCH S–103

Phone control switch S–103 operates in both the primary and the secondary circuits of the output transformer. When the equipment is operated with no load on the secondary of the transformer, extremely high audio voltage peaks occur across the primary winding and cause voltage breakdown between the two circuits of the switch and between the switch contacts and the grounded switch supports. It is important that a 600-ohm load be permanently connected to the 600-ohm speaker terminals to prevent the occurrence of these high voltage peaks. If a speaker is not used or if the speaker is disconnected, a 600-ohm resistor must be connected across the speaker terminals E–102.

In installations where no speaker is used it may be advantageous to set the PHONE OUTPUT ADJ. (screwdriver adjustment on left end of cabinet) to maximum to permit operating the gain control at a lower level.

In installations where there is no application for switch S–103 and arcing still occurs after applying the precautions described, the d–c portion of the switch can be removed from the circuit. Disconnect the three switch wires from the number three pin of V–110 and terminals B and P of T–120 (the wire from terminal B of T–120 to C–102 must be left connected). Connect a new lead from terminal P of T–120 to the number three pin of V–110. The 600-ohm load on the speaker terminals must still be maintained to avoid damaging the transformer. *2/1/46* ←

●

## CRYSTAL FAILURES IN MODELS RCK AND TDQ SERIES EQUIPMENTS

Recent reports from the field indicate frequent failures in the crystals supplied with the models RCK and TDQ series equipments, resulting in failure of the oscillator circuit. Inability of the crystals to oscillate is due to manufacturing processes in the factory producing these crystals. These processes have been analyzed and corrective measures taken which it is believed will relieve the situation.

The Naval Research Laboratory and the manufacturer of the RCK and TDQ crystals are conducting further investigation in an endeavor to determine other possible causes of crystal failures. In order to carry out these investigations it is requested that all cognizant Naval activities and field personnel assist as follows:

(1) All defective crystals for RCK and TDQ equipments should be immediately returned to the Resident Inspector of Naval Material, Camden, N. J., untouched, unopened, and with seals unbroken if sealed.

(2) Failure reports (NBS–383, Revised 4–44) should be submitted to the Bureau *for each crystal* sent to the RINM, Camden, N. J. The failure report should state that the crystal has been sent to RINM, Camden, N. J. Replacement crystals should be requisitioned in the usual manner.

●

## CONDENSER INSULATOR FAILURES IN MODEL RCK SERIES EQUIPMENTS

Recent reports from the field indicate several failures due to breakage of the isolantite insulators connecting the rotor shafts of the variable condenser sections of capacitors C–101, C–113, and C–126. As model RCK series equipments are comparatively recent receivers and many more are to be shipped, the Bureau requests complete information on these failures by speedletter and return of the failed parts to Code 981, Bureau of Ships, Washington 25, D. C., as promptly as possible. This is an urgent request and should not be construed as affecting the usual and prompt manner in which form NBS–383 (Revised 4–44) should be submitted to the Bureau on all component failures of radio equipment.

●

## INSTALLATION NOTES COVERING MODEL RCK SERIES RECEIVING EQUIPMENTS

The model RCK series receiving equipments have been developed for use with the model TDQ series transmitting equipments. These receivers are the first of a new series of equipments in which the i-f, audio and power circuits are standardized and the r-f, oscillator and mixer circuits are varied from model to model.

The RCK is a superheterodyne receiver designed to receive signals on any of four crystal controlled frequencies within the range of frequencies covered by the model TDQ transmitter. The model RCK receiver is approximately 11 inches high, 18 inches wide and 18 inches deep and weighs approximately 115 pounds. Power requirements are 106 watts at 110–120-volt, single-phase, 55–65-cycle AC. The tube complement is as follows:

| *No.* | *Type* | *Function* |
|---|---|---|
| 1 | 956 | R-F amplifier |
| 1 | 717A | Converter |
| 2 | 717A | Multipliers |
| 1 | 6N7 | Crystal oscillator–multiplier |
| 5 | 6AB7 | I-F amplifiers |
| 1 | 6H6 | Second detector–peak limiter |
| 2 | 6AB7 | Audio amplifiers |
| 1 | 6V6GT | Audio output amplifier |
| 1 | 6U4G | Rectifier |
| 1 | VR150/30 | Voltage regulator |

The power output is 15 milliwatts into a 600-ohm load. A single tuning control operates seven tuned circuits. This control has four mechanical detents which are present in accordance with the frequencies of the crystals in use. Change of frequency is rapid and the operating frequency to which the receiver is tuned is indicated by the "lighting up" of one of the four bulls-eyes over the tuning dial.

The receiver chassis is designed to be removed from the cabinet by loosening the thumbscrews on the front panel and sliding the entire chassis assembly forward on the guide strips on each side of the cabinet. The mounting base to which the shock mountings for the receiver are attached is

drilled with four holes through which 3/8" bolts of the proper length may be attached to fasten the receiver to a bench or table.

In planning an installation, care must be exercised to provide adequate clearance (minimum: 6¼") from the back of the receiver to the bulkhead or nearest obstruction to provide access to the power-input plug, antenna-ground plug, speaker plug, silencer plug and fuses.

The antenna input circuit is unbalanced to ground and is intended to terminate a 50-ohm transmission line. When used with the model TDQ series transmitter, the receiver input jack should be connected to the normally open position of the antenna change-over relay in the top chassis section of the transmitter.

Terminals are provided on the rear of the chassis for connection of 600-ohm speaker circuits. Speakers or speaker-amplifiers used in conjunction with the model RCK receiver should be operated with taps adjusted on the line side of the matching transformers for optimum impedance match.

Sufficient slack should be left in connecting cables to permit withdrawal of the chassis from the cabinet without necessitating removal of plugs. An angle adapter on the antenna input plug should not be used; it will prevent withdrawal of the chassis without removal of the plug.

Complete instructions regarding the setting of the dial detents, alignment, and adjustment are contained in the instruction books. In conformance with recent practice, the instruction books also contain a complete table of point-to-point voltages and resistance for use in servicing.

●

## OPERATION OF LOUD SPEAKERS WITH MODEL RCK SERIES RECEIVING EQUIPMENTS

The model RCK receiving equipment employs two stages of audio-frequency amplification which feed a power-amplifier output stage. The design is such as to impress a constant voltage (within three decibels) across the primary winding of the output transformer. This voltage is independent of changes in load resistance across the secondary terminals of the transformer from 600 to 30 ohms.

The maximum available undistorted output from the equipment is 100 milliwatts for a 600-ohm load. For a 30-ohm load, the power output is 850 milliwatts. The corresponding figures for resonant overload are 150 milliwatts and 1.35 watts. Thus, the model RCK is capable of operating a loud speaker, such as the type 49155, having a 30-ohm impedance and a nominal power input rating of 2 watts. If the RCK is to operate into a 600-ohm load, an amplifier-speaker such as the type 49131 will have to be employed for satisfactory loudspeaker reproduction. The audio-frequency output characteristics of the model RCK equipment are approximately the same as the corresponding characteristics of the models RBB/RBC receiving equipments and the same treatment would apply to these latter equipments when loudspeaker operation is considered.

●

## PROPER CONNECTIONS BETWEEN MODEL RCK EQUIPMENTS AND TYPE 49155 LOUD-SPEAKER UNITS

The design of the audio output circuit of the model RCK receiver is such that maximum audio power is available at the speaker jack J–304 when the actual load impedance is much lower than 600 ohms.[1] Therefore, for satisfactory operation of single loudspeaker units of type 49155 with the model RCK, the 30-ohm input taps on the speaker unit should be connected to the receiver output, even though the latter is designated 600 ohms.

●

## INCORRECT VALUE OF RESISTOR R–246 IN MODEL RCK EQUIPMENTS

NYMI has reported to the Bureau that resistor R–246 in many new model RCK receivers varies from 55,000 to 100,000 ohms. The correct value of this resistor is 47,000 ohms, ±10%, and unless this value is used, it is impossible to adjust the input meter to zero set. Activities experiencing this trouble should check the value of resistor R–246 and replace it if it does not read approximately 47,000 ohms.

●

[1] This is explained in paragraph 1.115 of the instruction book.

## → RCK RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 1

### ADDITIONAL TUNING SET-UP SYSTEM (NO KIT)

*Equipments affected.*—All model RCK radio receivers.

*Purpose.*—To set the tuning dial exactly on the required frequency for each crystal without the use of a signal generator, and to indicate normal functioning of the multiplier tubes and circuits up to the final multiplier.

*Procedure.*—Only slight additions to the present preselector are required. The changes in the model RCK preselector unit required to provide the alignment facilities are as follows:

(1) Replace resistor R–110 (10,000 ohms) with a new value of 47,000 ohms.

(2) Connect the contact arm of a high quality, single-pole, double-throw switch to the junction of resistors R–109 and R–110. Connect one contact of the switch to ground and the other to the a-v-c bus at terminal 14 on terminal board E–104. The connection to the a-v-c bus can probably be more easily made to terminal 14 on terminal board E–204 in the IF/AF unit, with the lead to the above switch fed through the slot between terminal boards E–104 and E–204. Connection to the junction of R–109 and R–110 will probably require slotting the right-hand edge of the forward wall of the compartment on the top side of the preselector chassis (possibly by filing), in order to allow clearance for the lead.

The system operates by using a portion of the negative grid-bias voltage developed across the the final multiplier grid-leak resistor to bias the a-v-c bus in the receiver, thereby causing the input meter on the IF/AF unit panel to indicate (when the SELECTOR switch is set to AVC ON). This bias is developed only when the multiplier circuits are tuned to the crystal oscillator and reaches maximum in the optimum resonance region.

The switch may be of the toggle type, provided that it is of a high quality, low leakage construction, with good, positive, silver contacts. It should be protected against the effects of humidity. The switch should be mounted in a suitable manner on a bracket fastened to the side-brace or "wrap-around" at the left, behind the front panel. It should be plainly marked to identify the SETTING-UP and OPERATING positions. The receiver is substantially inoperative in the SETTING-UP position.

Since the final multiplier grid is tuned by two coupled tuned circuits, the indication at resonance will be similar to the flat-topped resonance curve usually obtained with such circuits. By taking the CHART dial (lower dial window) readings corresponding to the two flanks of the curve at one-third or one-half the maximum input meter reading (as obtained with the above switch in the SETTING-UP position) and setting the tuning dial to the mean or mid-point of the two readings, tuning of the circuits within one or two chart dial divisions of optimum as obtained with a signal generator have been observed at the laboratory.

Figure 1 indicates in graph form the indications obtained on the input meter. For instance, if dial readings X1 and X2 are 365 and 385, respectively, the detent should be set at $\frac{385+365}{2}$

Or 375.

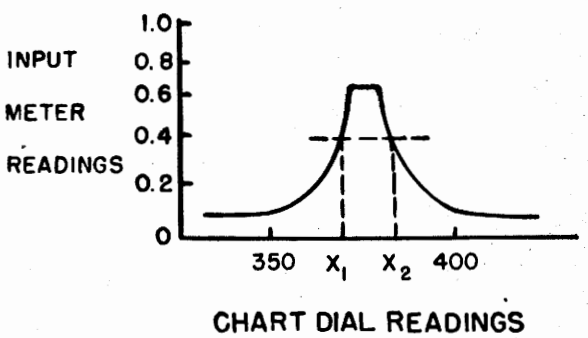



FIGURE 1.—Graph of the indications on the input meter while setting up the RCK tuning system.

Throwing the switch to OPERATING position grounds the junction of R–109 and R–110, and consequently grounds pin-jack J–103. This is desirable to avoid undesired biasing of the a-v-c system by possible leakage across the switch terminals in the OPERATING position. Since the input meter on the receiver can be used to indicate grid voltage conditions in the final multiplier, it is believed that the disabling of J–103 will not be objectionable.

*General.*—This change using available material is within the scope of the ship's force and should be accomplished at the earliest opportunity. The instruction book should be corrected accordingly.

A record of completion of this change should be made on the ship's "Radio Equipment Log", NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *2/1/46*

●

## RCK RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 2

### NOISE SUPPRESSOR WIRING CORRECTION (NO KIT)

*Equipments affected.*—All model RCK radio receivers.

*Purpose.*—To connect noise suppressor (R–240) for proper operation.

*Procedure.*—If the circuit is not operating as designed (early models of the RCK receiver had the noise suppressor (R–240) wired incorrectly at the factory), correct connections, as follows:

(1) Orange wire from the screen of V–209 to the moving arm (center terminal of R–240).

(2) The black ground wires should go to the right outside terminal of R–240 (when looking at the back of R–240 with the lugs down).

(3) The orange wire from R–266 (33,000 ohms, the end resistor on the rear strip) should go to the left outside terminal of R–240 (when looking at the back of R–240 with lugs down).

(4) When properly connected, the screen of V–209 is grounded by maximum counterclockwise rotation of R–240 (looking at shaft side of R–240). When R–240 is rotated to a maximum clockwise position, the screen of V–209 connects to R–266. This provides for minimum silencing when the knob is set at zero and maximum silencing when the knob is set at ten.

(5) In addition, if remote noise silencing is not to be used, a jumper wire must be placed in J–305, connecting the lower right hole to the top hole (terminals 1 and 3).

*General.*—This change using available material is within the scope of the ship's force, and should be accomplished at the earliest opportunity. Technicians are requested to check all RCK receivers for the correct wiring of the noise suppressor. The instruction book should be corrected accordingly.

A record of completion of this change should be made on the ship's "Radio Equipment Log," NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *2/1/46*

●

## RCK RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 3

### INSTALLATION OF TYPE 49509 PLUG ADAPTERS

*Equipments affected.*—All model RCK radio receivers.

*Purpose.*—To adapt the audio output plug to fit the type TTHFA–1 cable specified for use in audio circuits.

*Procedure.*—The plug adapter is to be installed in the following manner: (The numbers, in brackets, referenced throughout the text, refer to Fig. 1.)

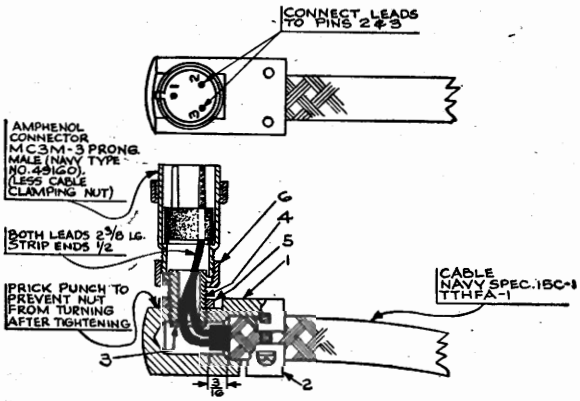



FIGURE 1.—Installation of plug adapter.

(1) Remove the cable clamping ring furnished with the plug, Navy type CPH–49160. The plug is supplied with the radio receiving equipments.

(2) Strip the ends of the two conductors ½" as shown in Figure 1.

(3) Insert the cable into the connector body [1] and pull the two conductors through the tapped hole in the body.

(4) Clamp the cable in place with clamp [2]. Two machine screws and lockwashers are furnished for this purpose.

(5) Insert the insulating washer [3] over the two conductors and into the bottom of the tapped hole in the conductor body [1]. (See Fig. 1.)

(6) Assemble bushing [4], locknut [5], coupling nut [6] and plug, Navy type CPH–49160. Insert the conductor leads into pins no. 2 and no. 3, as shown in Figure 1.

(7) Before tightening the locknut [5] note positions of the key and connections. Be sure that the positions agree with Figure 1. Tighten the locknut [5].

(8) Prick-punch the connector body adjacent to the locknut [5] to prevent it from turning.

(9) Solder leads to pins no. 2 and no. 3.

*General.*—Navy type 49509 plug adapter kits have been procured under contract NXsr–86317. Vessels are requested to contact an Electronics Officer at the earliest opportunity for the installation of the plug adapter. Instruction books should be corrected accordingly.

A record of completion of this change should be made on the ship's "Radio Equipment Log", NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *2/1/46*

## MODEL RCK SERIES TROUBLE-SHOOTING NOTES

| Difficulty Encountered | Cause and Remedy |
|---|---|
| No audio output. | Discovered one lead from capacitor C–243, on the side going to the second amplifier grid, was so close to chassis that voltage arced over to ground. However, it did not read "short" when measured to ground with an ohmmeter. Bent lead away from ground and replaced shorted capacitor, from silencer diode to second amplifier grid, with spare capacitor. Operation was again normal.—U. S. S. *Kassan Bay* |



638971—45——15

## → X-RDJ PULSE ANALYZER EQUIPMENT FIELD CHANGE NO. 1

### INCORPORATING CHANGES TO IMPROVE OPERATION OF MODEL X-RDJ PULSE ANALYZER EQUIPMENT (NO KIT)

*Equipments affected.*—All model X-RDJ pulse analyzer equipments, contract NXsr-51517, serial numbers 1 through 25.

*Purpose.*—To improve overall operation of the equipment.

*Material required.*—The following parts are necessary for this change and can be obtained from an Electronics Officer. One of each component should be properly labeled and placed in the equipment spare parts box. NOTE: *All resistors should have pig-tail type terminals.*

| Item | Quantity | Part and description | JAN or Navy type |
|---|---|---|---|
| 1 | 2 | Carbon resistor; 200 ohm ±5%, 1 watt. | RC31BE201J (63288-201) |
| 2 | 2 | Carbon resistor; 0.47 megohms ±10%, 1 watt. | RC31BE474K (63288-474) |
| 3 | 2 | Carbon resistor; 33,000 ohms ±10%, 1 watt. | RC31BE333K (63288-333) |
| 4 | 2 | Carbon resistor; 0.1 megohm ±10%, 1 watt. | RC31BE104K (63288-104) |
| 5 | 2 | Carbon resistor; 1.2 megohms ±10%, 1 watt. | RC31BE125K (63288-125) |
| 6 | 3 | Carbon resistor; 6,800 ohms ±10%, 2 watt. | RC41BE682K (63474-682) |
| 7 | 2 | Capacitor, silver mica dielectric, 4300 mmfd. ±5%, 500 V. D-C W. ⅝" dia, 3/32 x 5/16 mtg. stud, gnd. lug and solder terminals. | (482788-5) |
| 8 | 2 | Capacitor, mica dielectric; .01 mfd. ±20% 300 V. D-C W., 1 1/32" x 41/64" x 1 1/32" molded bakelite case, axial wire leads. | JAN-CM40B103M |
| 9 | 2 | Capacitor, mica dielectric; 0.0039 mfd. ±20% 500 V. D-C W., 53/64" x 53/64" x 3/32" molded bakelite case, axial wire leads. | JAN-CM30B392M |
| 10 | 1 | Vacuum tube, type 6AC7. Miscellaneous connecting wire. | JAN-6AC7 |

*Procedure.*—Reference should be made to the schematic and wiring diagrams when making this change.

(1) The pulse rate frequency circuit should be changed as follows:

(*a*) Replace capacitor C-128 (connects to position #1 of S-102A) with a silver mica capacitor, 4300 mmfd. ±5% 500 V. D-C W. (item #7 of material required). Label the new capacitor C-128.

(*b*) Replace resistor R-130 (Grid leak resistor of V-107) with a carbon resistor, 0.47 megohm ±10%, 1 watt (item #2). Label the new resistor R-130.

(*c*) Replace resistor R-134 (plate load resistor of V-107) with a carbon resistor, 33,000 ohms ±10%, 1 watt (item #3). Label the new resistor R-134.

(*d*) Replace resistor R-133 (screen dropping resistor of V-107) with a carbon resistor, 0.1 megohm ±10%, 1 watt (item #4). Label the new resistor R-133.

(*e*) Remove resistor R-131 (cathode resistor of V-107) and connect potentiometer R-132 direct to tube V-107.

(*f*) Remove resistor R-138 (connects to position #3 of S-102B) and connect potentiometer R-137 direct to switch S-102B.

(*g*) Replace capacitor C-116 (screen by-pass of V-107) with a mica dielectric capacitor, .01 mfd. ±20%, 300 V. D-C W. (item #8). The new capacitor should be designated C-116 and should be physically located in place of R-138.

(*h*) Replace vacuum tube V-107 (6SJ7) with a tube type 6AC7 (item #10).

(2) Replace the delay line terminal resistor R-108 (cathode circuit of V-102) with a carbon resistor, 200 ohms ±5%, 1 watt (item #1). Label the new resistor R-108.

(3) The oscillator circuit should be changed as follows:

(*a*) Replace capacitor C-138 (cathode and suppressor by-pass for V-108) with a mica dielectric capacitor, .0039 mfd. ±20%, 500 V. D-C W. (item #9). Label the new capacitor C-138.

(*b*) Remove jumper between ungrounded end of capacitor C-138 and resistor R-106.

(*c*) Remove jumper between terminal #3 of vacuum tube V-108 and capacitor C-138.

(*d*) Connect a jumper from terminal #3 of vacuum tube V–108 to the terminal of resistor R–106 vacated in change in paragraph (b).

(*e*) Connect a jumper from the ungrounded side of capacitor C–138 to the ungrounded end of resistor R–162 (cathode resistor of V–109).

(4) The following changes should be made to protect the clamper tube:

(*a*) Break the direct connection between the high sides of the horizontal positioning controls R–194A and R–194B and insert a carbon resistor, 1.2 megohms ±10%, 1 watt (item #5). Label the new resistor R–201.

(*b*) Connect the high side of vertical positioning controls R–192A and R–192B to the regulated 150-volt d-c supply instead of the 300-volt d-c unregulated supply. This connection can be made at the terminal leg of R–133 facing the front panel of the receiver.

(5) The following change reduces the pattern shift between elliptical and slave sweeps at low sweep rates:

(*a*) Remove capacitor C–147 (connects between pin #5 of V–111 and positions #2 and #3 of S–104B) and connect the contacts of switch S–104B direct to the plate terminal #5 of tube V–111B and resistor R–178.

(6) The following change is made to reduce the number of failures of resistors R–128 and R–129:

(*a*) Replace resistors R–128 and R–129 with carbon resistors, 6,800 ohms ±10%, 2 watt (item #6). Label the new resistors R–128 and R–129.

*General.*—This field change, using available material, is within the scope of the ship's force and should be accomplished at the earliest opportunity. The schematic diagrams, wiring diagrams and parts lists should be corrected accordingly.

Tag and retain for emergency use the removed parts. Place the field change equipment spares in the equipment spare parts box.

A record of completion of this change should be made on the equipment log of modifications and changes. Completion of this change should be reported on the NBS–383 card. *4/1/46*

●

## RDJ PULSE ANALYZER EQUIPMENT FIELD CHANGE NO. 1

### INCORPORATING CHANGES TO IMPROVE OPERATION OF MODEL RDJ PULSE ANALYZER EQUIPMENT (NO KIT)

*Equipments affected.*—Model RDJ pulse analyzer equipment, contract NXsr–66741, serial numbers 1 through 250.

*Purpose.*—To protect the clamper tube, to reduce the pattern shift between elliptical and slave sweeps at low sweep rates, and to reduce the number of failures of resistors R–128 and R–129.

*Material required.*—The following parts are necessary for this change and can be obtained from an Electronics Officer. One of each item should be properly labelled and placed in the equipment spare parts box. NOTE: *All resistors should have pig-tail type terminals.*

| Item | Quantity | Part and description | JAN or Navy type |
|---|---|---|---|
| 1 | 2 | Carbon resistor, 1.2 megohm ±10%, 1 watt. | RC31BE125K (63288–125) |
| 2 | 3 | Carbon resistor, 6,800 ohm ±10%, 2 watt. | RC41BE682K (63474–682) |
| | | Miscellaneous Connecting Wire. | |

*Procedure.*—Reference should be made to the schematic and wiring diagrams when making this change.

(1) *The following changes to protect the clamper tube should be made to equipments numbered 1 through 67 only:*

(*a*) Break the direct connection between the high sides of the horizontal positioning controls R–194A and R–194B and insert a carbon resistor, 1.2 megohm ±10%, 1 watt (item #1). Label the new resistor R–201.

(*b*) Connect the high side of the vertical positioning controls R–192A and R–192B to the regulated 150-volt d-c supply instead of the 300-volt d-c unregulated supply. This connection can be made at the terminal leg of R–133 facing the front panel of the receiver.

(2) *The following change, reducing the pattern shift between elliptical and slave sweeps at low sweep rates, should be made to equipments numbered 1 through 216 only:*

(*a*) Remove capacitor C–147 (connects between pin #5 of V–111 and positions #2 and #3 of S–104B) and connect the contacts of switch S–104B direct to the plate terminal #5 of tube V–111B and resistor R–178.

(3) *The following change to reduce the number of failures of the resistors R–128 and R–129 should be made to equipments numbered 1 through 250:*

(*a*) Replace resistors R–128 and R–129 with carbon resistors, 6,800 ohms ±10%, 2 watts each (item #2). Label the new resistors R–128 and R–129.

*General.*—This field change, using available material, is within the scope of the ship's force and should be accomplished at the earliest opportunity. The schematic diagrams, wiring diagrams and parts lists should be corrected accordingly.

Tag and retain for emergency use the parts removed. Place the field change equipment spares in the equipment spare parts box.

A record of completion of this change should be made on the equipment log of modifications and changes. Completion of this change should be reported on the NBS–383 failure report form.
*4/1/46* ←

## → RDP PANORAMIC ADAPTORS

## FIELD CHANGE NO. 1

### EXTENSION OF SWEPT OSCILLATOR SHAFT (NO KIT)

*Equipments affected.*—All model RDP panoramic adaptors.

*Purpose.*—To alleviate alignment difficulties and safeguard personnel.

chassis, and the other end of the shaft is supported by its insertion into the tuning slug assembly. The bracket is mounted by means of 6–32 screws and bolts, for which holes are drilled through the side of the chassis with a #28 drill. A third hole, $13/32$-inch in diameter, permits access to the screwdriver slot in the extension shaft. Spring loading is provided

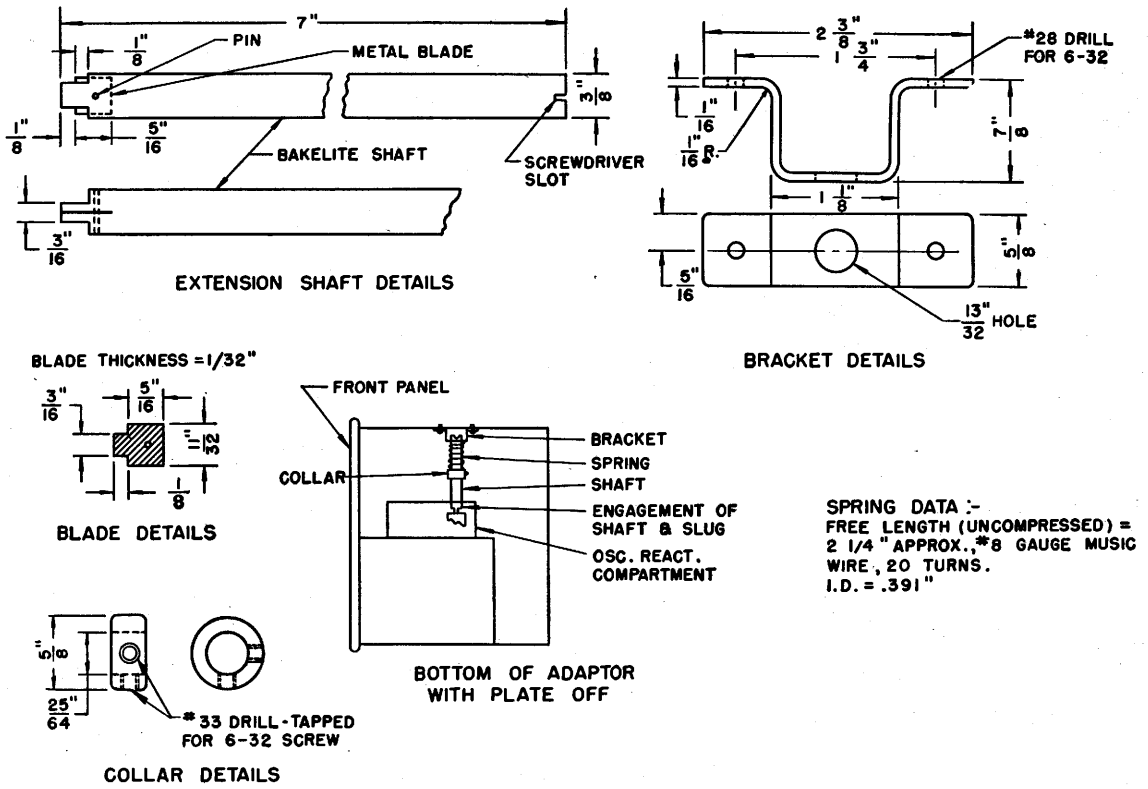



FIGURE 1.—Field change No. 1 to the model RDP panoramic adaptor.

*Procedure.*—Details of this modification are shown in Figure 1. Minor alterations may be made to meet the particular needs of the activity making the modification.

A $3/8$-inch diameter Bakelite shaft is supported in such a manner that one end continually engages the swept oscillator tuning slug. The other end of this shaft is slotted to provide for insertion of an ordinary screwdriver to allow for adjustment of the tuning slug. The outer end of the shaft is supported by a bracket extending from the inside edge of the adaptor to prevent dislocation of the extension shaft due to shock or vibration.

To remove the extension shaft, a collar at the end of the compression spring must be loosened. This allows the shaft to be slid out through the access hole in the side of the chassis.

To adjust the swept oscillator tuning slug it is only necessary to slide the equipment out of its cabinet far enough to allow reaching the access hole exposing the screwdriver slot.

*General.*—Alignment difficulties have been encountered in the model RDP. It is neces-

sary to remove the bottom cover plate from the adaptor chassis in order to adjust the swept oscillator tuning slug Z–101–09. Insertion of an alignment tool brings the operator's fingers in close proximity to high voltage components.

Investigation of this condition revealed the possibility of a simple modification that could be made to existing equipments, thereby alleviating both difficulties.

This change using available material is within the scope of the ship's force and should be accomplished at the earliest opportunity. A record of completion of this change should be made on the ship's "Radio Equipment Log", NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *3/1/46* ←

## → REA RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 1

### RECEIVER OUTPUT LINE CONNECTIONS (NO KIT)

*Equipments affected.*—All model REA radio receivers.

*Purpose.*—To prevent crossing of channels A and B into the voice frequency terminal equipment when channel switch S2 is moved from channel A to channel B position.

*Procedure.*—Connect the lines to the receiver output to terminals G1 and G2 for channel A and to terminals G3 and G4 for channel B on terminal panel no. 17 (near bottom of second bay).

*General.*—After modification, the lines will be connected on the receiver side of channel switch S2, located on the monitor panel of the center bay. With this connection there will be no possibility of crossing the outputs of channels A and B into the lines going to the voice frequency terminal equipment when the channel switch S2 is moved from channel A to channel B position. Switch S2 will still permit the switching of the monitor outputs of channel A and channel B into either monitor jack on the monitor panel of the second bay.

The instruction bulletin no. 982, paragraph 2.5, page 3 of volume two, should be corrected accordingly. This change using available material is within the scope of the ship's force and should be accomplished at the earliest opportunity. A record of completion of this change should be made on the ship's "Radio Equipment Log", NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *3/1/46*

●

## REA RADIO RECEIVING EQUIPMENT FIELD CHANGE NO. 2

### AVC CIRCUIT MODIFICATION

*Equipment affected.*—All model REA radio receivers.

*Purpose.*—To reduce the effect of any changes in a-v-c voltage due to gaseous grid current flow through R–22 and R–23.

*Procedure.*—Resistors R–22 and R–23, 2 megohms each, should be replaced by ½-megohm resistors. Capacitors C–7 and C–8, 4 mfds. each, should be replaced by 16-mfd. capacitors.

*General.*—As an example, assume that R–23 is left at 2 megohms. If a total of one microampere of gaseous grid current flows through R–23, then 2 volts will be developed across R–23 in opposition to the normal 10-volt a-v-c voltage providing a net a-v-c voltage of 8 volts which is applied to the stages using slow acting AVC. This condition would cause an increase in output of the channel branch amplifiers. This condition would be more objectionable if some gaseous grid current flows through R–22 in the compensating a-v-c circuit. By decreasing the values of R–22 and R–23 to ½-megohm each the effect of a slight amount of gaseous grid current would have a negligible effect on the a-v-c voltage. If it is assumed that 1 microampere of gaseous grid current flows through a ½-megohm resistance, only ½ volt would be developed across it. The net resultant a-v-c voltage in the modified circuit would be 9.5 volts instead of the 8 volts previously obtained. The time constant of the circuits is not changed by reducing the value of R–22 and R–23 if the values of the capacitances C7 and C8 are increased to such a value that the RC product remains constant. The change from 4 mfd. to 16 mfd. in each case is to satisfy this condition.

This change using available material is within the scope of the ship's force and should be accomplished at the earliest opportunity. The instruction book should be corrected accordingly. A record of completion of this change should be made on the ship's "Radio Equipment Log", NAVSHIPS 900,039. Completion of this change should be reported on the NBS–383 card. *3/1/46* ←

●

# SECTION 8. RECEIVING EQUIPMENT

## INSTALLATION OF RU RECEIVERS AND A-C POWER PACKS

RU receivers and a-c power packs have been received and installed in various Naval Air Activity Control Towers. At the Naval Air Training Bases, Corpus Christi, Tex., it was found necessary to modify the a-c power pack in order to bring each receiver output up to loud speaker volume. The modification was made as illustrated in Figure 1.

The GF–RU–LN equipment is installed in movable fabricated consoles, each containing two RU receivers, one a-c power pack, two speakers and controls for each receiver. The photograph of Figure 2 shows two of these consoles installed in a tower.

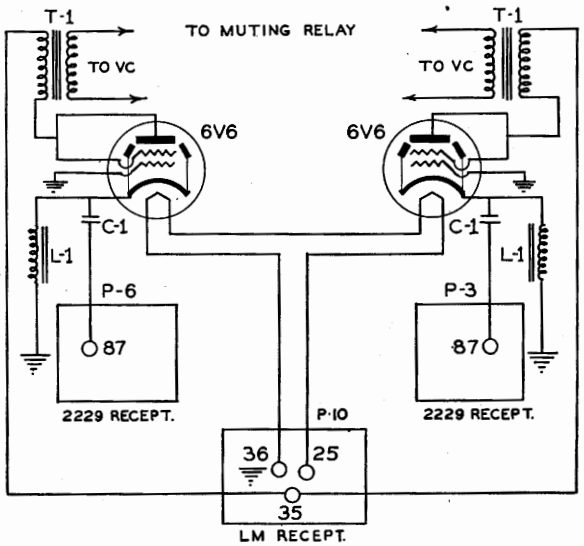



FIGURE 1.—Modification of power pack of model RU receiving equipment.

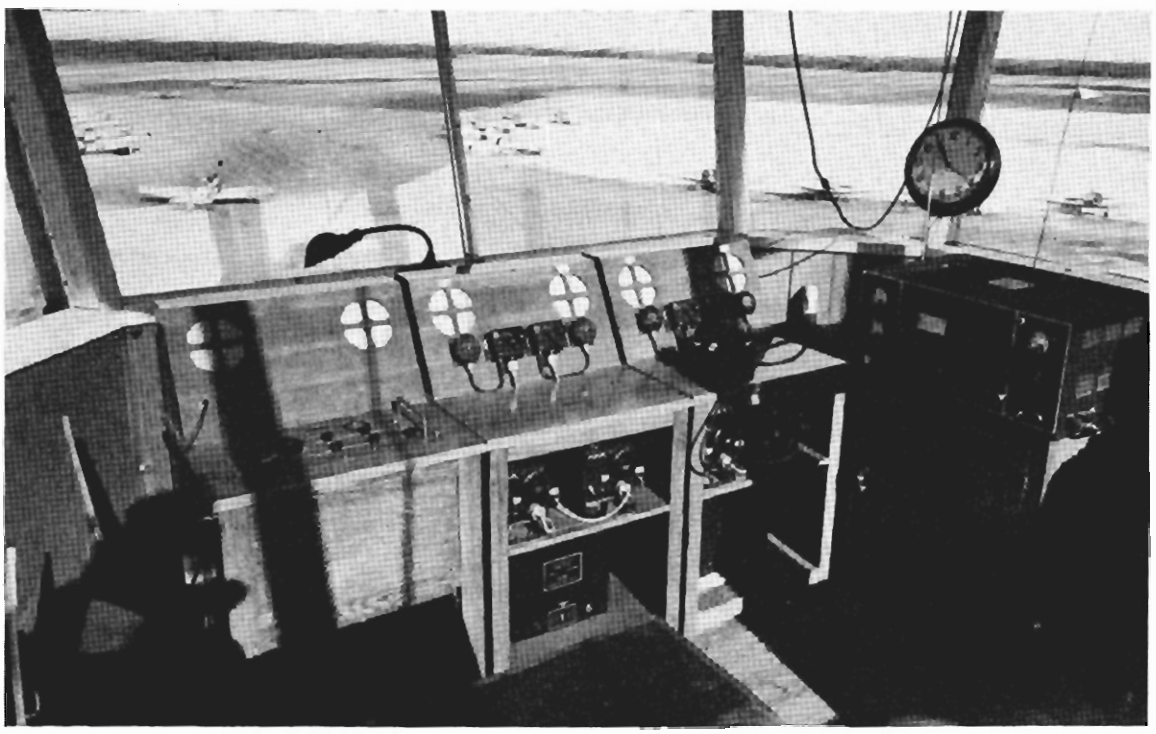


FIGURE 2.—Air control tower containing two movable consoles.