

Notes on Construction and Operation

This highly efficient radio is the latest in the KNIGHT "Ocean Hopper" series. It is easily constructed by the beginner, yet is sensitive enough to pull in stations from all over the world. Six ready made tuning coils cover frequencies from 155Kc to 35 MC, including amateur, police, commercial, and broadcast bands. These coils are factory wound, eliminating the cut-and-try method usually involved when you make your own coils. Beam-power output provides loudspeaker operation on the stronger stations. The only tools required for constructing the unit are a soldering iron, a pair of longnosed pliers, a diagonal cutter and a screwdriver set.

ASSEMBLY

Before beginning the assembly, check off each component against the list of material at the end of this manual. If you are unable to identify some of the parts by sight, locate them on the pictorial diagram. The information given on this diagram will help you to identify all of the parts. The values and voltage rating of all capacitors are printed on each unit. Resistor values, if not directly printed on each unit, can be determined with the aid of the enclosed color code chart.

Study the pictorial diagrams very carefully to familiarize yourself with the location of all components. The pictorials should be used for the assembly and wiring because they show the actual location and placement of all parts and wires. The schematic diagram can be used for checking the work and for eventual servicing later.

Begin the assembly by mounting all parts to the chassis in the following sequence.

- (1) **THE TUBE AND COIL SOCKETS.** These must be mounted from underneath the chassis and positioned as shown in the pictorial diagram.
- (2) **THE FILTER CHOKE AND OUTPUT TRANSFORMER.** These two units are mounted in the same mounting holes. The output transformer can be identified by its 4 wire leads. It is mounted underneath the chassis, while the filter choke (two leads) is mounted above the chassis.
- (3) **THE SPEAKER OUTPUT STRIP.**
- (4) **THE HEADPHONE OUTPUT JACK.**
- (5) **THE ANTENNA CLIP.** This clip must be insulated from the chassis with one shouldered and one plain fiber washer. (see the small insert illustration for details.)
- (6) **THE REGENERATION CONTROL.** Mount this control with the lock washer behind the chassis.
- (7) **THE 15 MMFD. VARIABLE (BANDSPREAD) CAPACITOR.**
- (8) **THE 2-GANG VARIABLE (BANDSET) CAPACITOR.** This unit has three tapped holes in the bottom of the frame which correspond with the mounting holes in the chassis. It is fastened down with three 6-32 x $\frac{5}{16}$ screws inserted from underneath the chassis. Notice that a 3-terminal tie strip is inserted under the head of one of the capacitor mounting screws. (Always keep the plates of the variable capacitors fully closed when working on the unit, to prevent damage to the plates.)
- (9) **THE 3-SECTION ELECTROLYTIC CAPACITOR.** This unit is supplied with a mounting strap. Bend this strap in such a way that the capacitor does not extend beyond the edge of the chassis. It may be necessary to slide the strap towards the positive end of the capacitor in order to position it as shown in the diagram.

- (10) **THE RUBBER GROMMETS.** See pictorial diagram for location.

NOTE: The front panel will be attached to the chassis after all chassis wiring has been completed. It will then be necessary to remove the hex nuts holding the regeneration control and the bandspread capacitor and place them in front of the panel.

WIRING

Study the pictorial carefully and notice the position of all wires and components. The actual wiring sequence is unimportant. It is suggested, however, that all wire leads be installed first, followed by resistors and fixed capacitors. To turn out a professional looking and well operating set keep all leads as short as possible and close to the chassis. Most leads on fixed resistors and capacitors are longer than necessary. Clip off these leads so that they are just long enough to permit good connections to their respective connecting points. Use a colored pencil to fill in each part, on the pictorial diagram, as it is connected. Work slowly and carefully check each connection. A few minutes spent in double-checking while you work may save hours of trouble-shooting later. Solder all connections, using rosin core solder only. Avoid acid core solder and acid flux to prevent corrosion. Pre-heat parts for better work. Do this by holding the soldering iron tip against wire and terminal for a few seconds. Then apply just enough solder to cover the connection and fill the crevices between the wires. Remove the iron, but do not move the wires until the solder has set—this takes only a few seconds. When more than one wire is to be connected at a particular point, do not solder until all of them are installed to that point.

FINAL ASSEMBLY

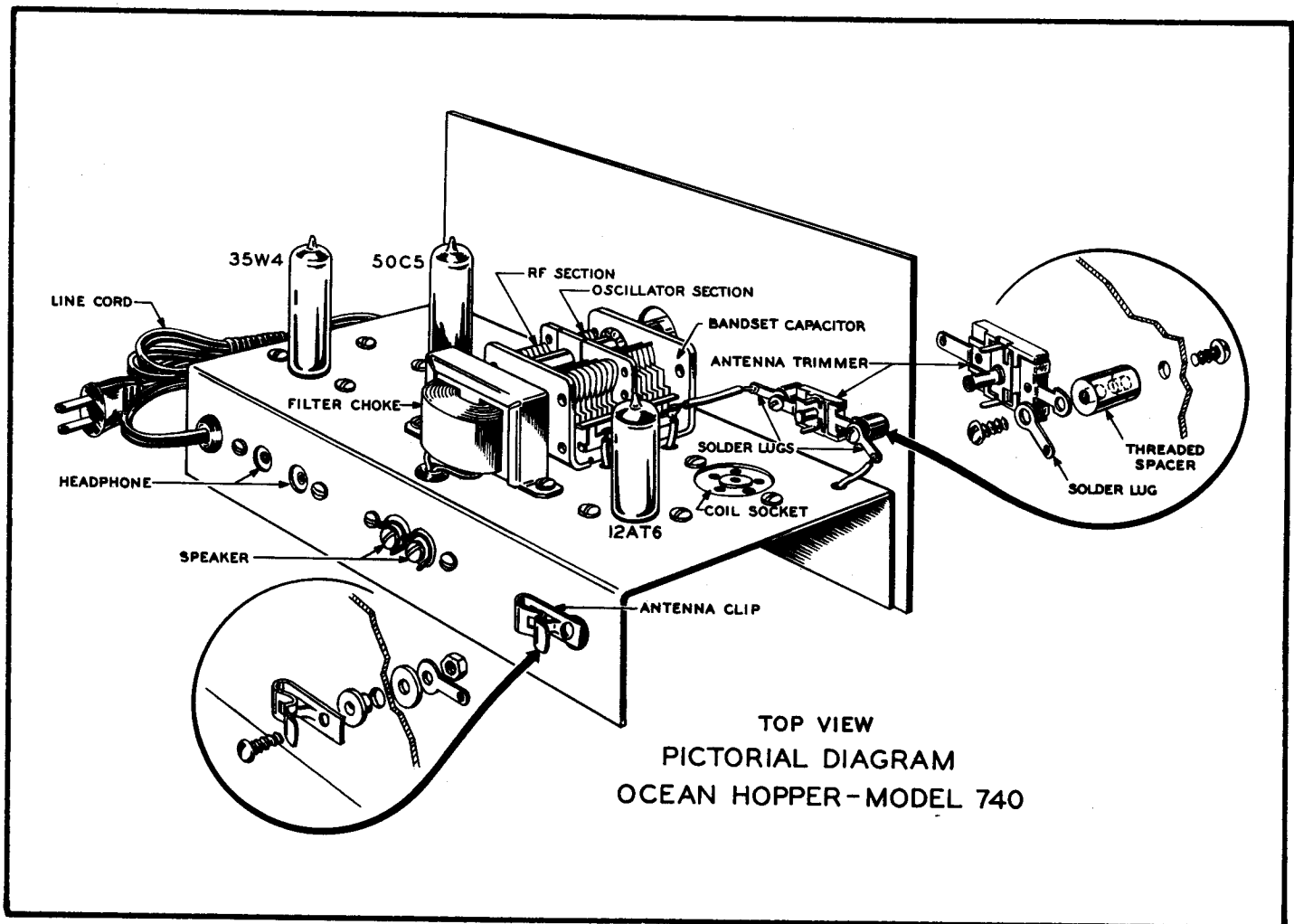
Having completed all of the under-chassis wiring, remove the hex nuts holding the regeneration control and band-spread capacitor and slide the front panel over the threaded bushings of these controls. You will find that the holes in the panel will line up with the various control shafts. Replace the hex nuts in the front of the panel **MAKING SURE THAT THEY ARE TIGHTENED SECURELY.** Install the antenna trimmer capacitor on the front panel as shown in the top view diagram. Be sure to connect the final wires from the antenna trimmer to the band-set capacitor and to the solder lug of the antenna clip assembly.

Three knobs, one transparent plastic and two pointer knobs, are supplied with the kit. A special circular dial plate is provided for the transparent knob. A hole in the center of the dial plate will permit it to fit over the knob shank. Press the dial into the knob firmly in such a way that the dial scale can be seen from the front. There should be a friction fit between the dial plate and the knob so that the dial will not rotate inside the knob. However, the dial should not be forced to fit the curvature of the knob face, to prevent buckling of the dial scale.

After inserting the dial plate, make sure that the plates of the bandset capacitor are fully closed and slide the knob onto the Knurled Shaft in such a way that the number "0" on the dial scale is directly under the vertical line on the panel.

With the plates of the band spread capacitor fully closed, attach a pointer knob to the shaft by securely tightening the set screw in the knob against the shaft of the capacitor. The pointer should indicate "0" on the dial scale appearing on the panel.

The unit is now ready for testing and operation.



ANTENNA REQUIREMENTS

The importance of a good antenna, for satisfactory short wave reception, can not be overemphasized. (A "ground" is not needed because the power line itself serves as a ground.) With the broadcast band coil, a few feet of wire strung around the room will probably suffice for satisfactory results. For the short wave bands however, a good outside antenna should be used if long distance reception is expected. Such an antenna should be between 50 and 100 feet in length, and should be mounted as high off the ground as possible. An excellent, inexpensive antenna kit (supplied with instructions) is listed under **ACCESSORIES** at the end of the **LIST OF MATERIAL**.

OPERATION

A regenerative receiver, while not difficult to operate, requires some practice before peak performance, particularly on short wave, can be obtained. This unit is supplied with a coil covering the entire broadcast band, from 530 to 1900 KC. Even if you have purchased additional coils, it is suggested that you experiment first with the broadcast band coil, where tuning is less critical. Plug the tubes into the proper sockets and insert the BC coil into the coil socket. Connect a speaker or headphones to the proper connectors, and attach your antenna to the antenna clip. Insert the line cord plug into the wall outlet, and turn the set on. Allow a minute or two for the set to warm up. You will notice a red glow in the

tubes if the filament circuit has been connected correctly. If the tubes do not light up, check the filament circuit for a wiring error.

After the set has warmed up, advance the regeneration control to about midway and turn the band-set capacitor over its full range. As this capacitor is rotated slowly you will hear a series of whistles or "howls". These indicate that the receiver is oscillating properly and that a radio station is being passed. Each whistle is in effect, a "beat" between the oscillations in the receiver and the signal from a station.

As you tune very slowly across one of these whistles you will notice that it starts with a very high pitch which becomes lower and lower in frequency until a "null" point is reached where no whistle is heard. On the other side of this "null" point the whistle will first be low in pitch and become higher as the station is passed. The "null" point indicates that you are tuned exactly to the station.

Once you have tuned to a "null" point you will probably be able to hear the station, but you must adjust the set properly in order to obtain best volume and clarity. This is done by turning down the regeneration control until the set no longer oscillates and no more whistles are heard. As the regeneration control is being turned, you will have to retune the band-set capacitor slightly in order to maintain the "null" point. Best volume will be obtained at that critical point of the regeneration control where the set just stops oscillating. This is also the point

of maximum selectivity (ability of the set to separate adjacent stations). In the absence of a signal, oscillations in the receiver make themselves known by a soft hiss or a "thud" in the speaker, or earphones, as the regeneration control is rotated from "off" to maximum.

The proper adjustment of the antenna trimmer capacitor greatly influences the performance of the set. If the trimmer is fully closed, you will be unable to make the set oscillate, regardless of the setting of the regeneration control. The broadcast stations will come in with good volume but you will be unable to separate one station from the other. With the trimmer capacitor fully open, the set will oscillate and you can separate stations, but the volume will not be as loud. The best compromise setting of the trimmer, therefore, is that where the capacitor is closed as far as possible but you can still make the set oscillate over the whole range of the bandset capacitor, with the regeneration control. Proper setting of the trimmer capacitor will vary with each coil and will be more critical on short wave than on broadcast stations.

Having experimented with the broadcast coil, you are now ready to explore the short waves. Plug in a short wave coil and proceed exactly as before. You will now find, however, that you can not tune to the "null" point of a signal with the bandset condenser because the signal

occupies only a very small portion of the band. Here the advantage of the band-spread capacitor will make itself felt. This capacitor makes tuning much easier by literally "spreading out" a small portion of the band. On short waves, therefore, the bandset capacitor is used to tune to the proximity of signal, as indicated by a whistle, while the band spread capacitor is used for fine tuning for the "null" point.

RECEPTION OF CODE (CW) SIGNALS

Unlike the broadcast band, where all stations carry voice or music, many short wave stations send only the dots and dashes of Morse Code. These stations can be heard with your receiver only when the set is oscillating. Best sensitivity and selectivity for code stations will be obtained with the regeneration control set in such a way that the set barely oscillates. On code stations the band-spread capacitor can be used to change the pitch of the signal for the most pleasing tone.

CAUTION

Never touch any part of the under-chassis wiring while the line plug is connected to the wall outlet. Always remove the plug from the power line receptacle when working on the set.

Never use the receiver on or near a grounded metal bench, radiator, sink, or other grounded metal object.

LIST OF MATERIAL

- | | |
|--|--|
| 1 12AT6 tube | 1 .00025 mfd. mica capacitor |
| 1 50C5 tube | 1 .0001 mfd. mica capacitor |
| 1 35W4 tube | 2 .1 mfd. tubular capacitors |
| 1 2-gang variable "bandset" capacitor (superhet type) | 2 .05 mfd. tubular capacitors |
| 1 15mmf. variable "bandsread" capacitor | 1 .02 mfd. tubular capacitors |
| 1 3-30mmf. "antenna trimmer" capacitor | 1 .005 mfd. tubular capacitors |
| 1 Output transformer | 1 Chassis |
| 1 Filter choke | 1 Panel |
| 1 10,000 ohm potentiometer, with switch—regeneration control | 1 Line cord and plug |
| 1 30-30-20 mfd. 150-150-25V electrolytic capacitor | 3 7-pin miniature sockets |
| 1 200 ohm, 10 watt resistor | 1 Dual pin jack (headphone jack) |
| 1 1 megohm, 1/2 watt resistor | 1 2-term. output strip (speaker strip) |
| 1 470,000 ohm, 1/2 watt resistor | 1 Fahnestock clip (antenna clip) |
| 1 270,000 ohm, 1/2 watt resistor | 1 5-prong water socket |
| 1 82,000 ohm, 1/2 watt resistor | 1 Circular dial scale |
| 1 150 ohm, 1/2 watt resistor | 2 Pointer knobs |
| 1 3 terminal tie strip | 1 Shouldered Washers |
| 1 Broadcast coil | 1 Flat fiber |
| 1 Tuning knob | 10 Hex Nuts 6-32 x 5/16" |
| 1 Instruction sheet | 13 Machine screws |
| 2 Grommets | 2 Spacers |
| 6 Machine screws 4-36 x 3/8" | 4 Machine screws 6-32 x 1/4" |
| 6 Hex nuts 4-36 x 1/4" | 3 Solder lugs |

83 S 740 Complete with Tubes. Shipping Weight 5 lbs.

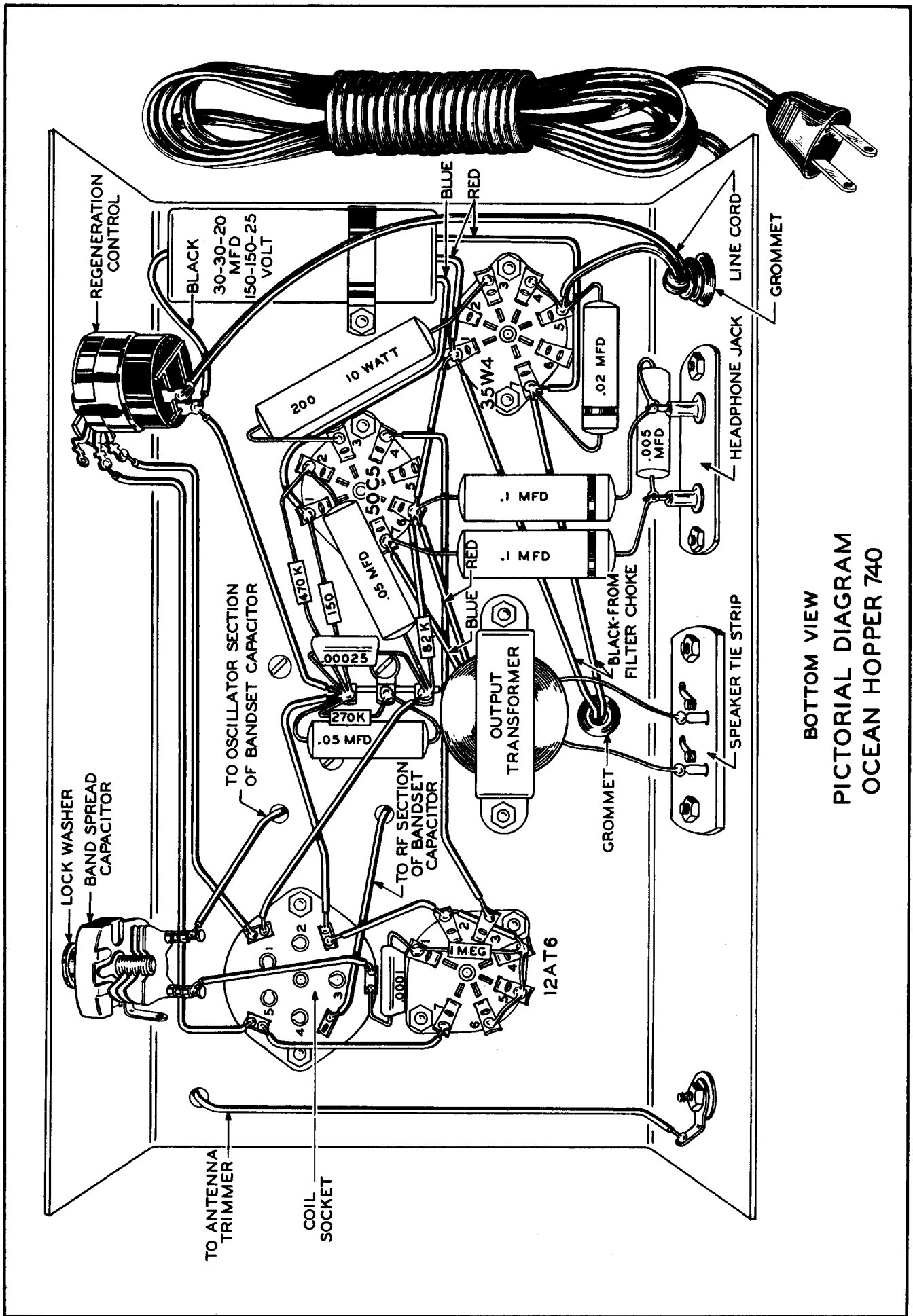
ACCESSORIES YOU MAY NEED

- | | |
|----------------------------|------------------------------|
| 59 J 110 Headphones | 83 S 742 Coil, 1.650MC—4.1MC |
| 81 D 323 Speaker | 83 S 743 Coil, 2.9 MC—7.3 MC |
| 83 C 100 Antenna Kit | 83 S 745 Coil, 7 MC—17.5 MC |
| 83 S 741 Coil, 155KC—470KC | 83 S 744 Coil, 15.5MC—35 MC |

ALLIED RADIO CORPORATION

100 N. WESTERN AVE.

CHICAGO 80, ILL.



BOTTOM VIEW
 PICTORIAL DIAGRAM
 OCEAN HOPPER 740